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THE PITUITARY HORMONES. A REVIEW.*

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Smallest of cur ductless glands, but with the greatest number of known functions, the pituitary, ensconced in its osseous throne room, reigns supreme among the endocrines. It has not been for long, however, that the student has been burdened with the task of learning its various functions, for until the present century, our texts have culminated the brief morphological description of this "embryonic relic" with the disheartening remark, "Nothing is known concerning its functions." In 1886, however, Marie[1] had demonstrated the presence of pathological changes in the pituitary gland in cases of acromegaly, although Minkowski was probably the first to recognize that this relationship was causative, and in 1895 the pressor effect of the gland was first determined. From then on, it was not long before the posterior portion of the hypophysis readily yielded its secrets, but the anterior portion was much more reticent, and for years investigators wandered through a dense fog of poorly controlled experiments and misinterpreted data. Not until this past decade was the correct path finally apparent, and progress became more and more rapid, until the goal is now coming into view.

Our present knowledge of the pituitary functions may be briefly summarized as follows:

A. THE POSTERIOR PITUITARY.

The pressor activity of whole pituitary extracts was discovered by Oliver and Schaefer[2] in 1895. Howell[3] in 1898 proved that this effect was confined to the posterior lobe, and Dale[4] in 1906, showed the existence of the oxytocic principle, first used in obstetrics by Bell[5] in 1909. These two substances were finally separated by Kamm.[6] The effect of the vasopressor hormone on urine secretion was reported in 1906,[7] and its use in diabetes insipidus in 1913.[8]

It must be noted, however, that discussion is still rampant as to whether the posterior pituitary actually secretes these hormones, or merely serves as a storehouse for them, as actually secreted by the intermediate lobe of the hypophysis.

These two substances, the vasopressor and oxytocic hormones, both of which activate smooth muscle, have been available to the medical profession for years, in the treatment of post-partum hemorrhage, gas distention of the intestines, diabetes insipidus, and circulatory shock. Some proprietary preparations of the posterior lobe are: *Pituitrin* (oxytocin and vasopressin), *Pitocin* (oxytocin), and *Pitressin* (vasopressin) (Parke, Davis).

B. THE ANTERIOR PITUITARY.

(1) The Growth Hormone.

Following Marie's work on acromegaly, Massalongo[9] in 1892 suggested that acromegaly is merely a gigantism occurring after closure of the epiphyses, with an overactive deposition of osseous tissue by the periosteal membrane. In 1910, Aschner[10] proved that hypophysectomized puppies remained dwarfed as well as sexually infantile; which results made it appear that Marie's acrogmegaly must represent a condition of hyperpituitarism, and that the pituitary was a most potent factor in regulating growth. The next logical step was performed by H. Evans and Long in 1921,[11] who, after obtaining the usual negative results with feeding experiments, were able to markedly increase the growth rate of rats by the injection of a crude pituitary extract. This was later obtained in a more purified form[12, 13]. Some favorable clinical results with this growth hormone have been reported.[14] Available proprietary prepa-

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rations containing this growth hormone include *Phyone* (Wilson), and *Antuitrin G* (Parke, Davis).

(2) The Gonadotropic Hormone.

It has been recognized for some time that hypopituitarism, both clinical and experimental, was associated with hypoplasia of the reproductive glands and suppression of the secondary sex characteristics. Hypertrophy of the anterior lobe during pregnancy was reported in 1898[15] and in eunuchs in 1908.[16] Crowe et al[17] in 1910 linked pituitary disturbances with adiposity and sexual infantilism. Cushing and Goetsch[18] then showed that it was probably the anterior lobe which was responsible for the sex-stimulating effect, but prior to 1921, the effects of feeding the gland on the gonads of experimental animals were variable and generally negative. H. Evans and Long[19] finally succeeded in producing hypertrophy of the ovaries by the injection of an alkaline extract of the anterior lobe. This procedure opened the way for a great deal of work in the succeeding years, and in 1927, Smith and Engel,[20] and Zondek and Aschheim,[21] simultaneously discovered that implants of the anterior lobe into immature rats and mice caused ovulation and formation of corpora lutea. Smith likewise found that ovarian atrophy following hypophysectomy was repaired by pituitary implants. In 1931, Fevold et al,[22] and later Z. Wallen Lawrence,[23] showed that the anterior hypophysis secretes two fractions: one which stimulates ovarian follicular growth; the other producing luteinization. The knowledge simultaneously gained during this time, concerning the ovarian and corpus luteum hormones, finally enabled us to postulate the present theory of menstruation, based upon a rhythmical activity of the anterior lobe of the pituitary, first stimulating production of the follicular hormone (estrin), then ovulation, and finally production of the corpus luteum hormone (progestin). Lower[24] believes that this gonadotropic hormone may be concerned in the enlargement of the prostate.

This gonad-stimulating hormone is not yet available clinically, although we do have a substance which resembles it to some extent, but which is probably formed by the placenta: *placental prolan.* This hormone is execreted in the urine during pregnancy so long as viable placental tissue is in contact with the maternal circulation,[25] and is responsible for the rat and rabbit ovulation tests for pregnancy. That this urinary prolan of pregnancy is not identical with the gonadotropic hormone of the pituitary has been proven by Leonard.[26] Placental prolan, extracted from the urine of gravid women, is obtainable commercially as *Antuitrin S* (Parke, Davis), and *Follutein* (Squibb). Some favorable reports have been made concerning the use of this substance in the treatment of infantile uterus, dysmenorrhea, aspermia, and genital hypoplasia in the male[27, 28, 29]. Prolan is standardized in rat units; one unit being that amount necessary to produce ovulation in an immature female rat, when injected subcutaneously.

(3) The thyreotropic hormone.

As early as 1889, Rogowitsch[30] reported a hypertrophy of the pituitary following thyroidectomy of the rabbit, but nothing further of importance concerning the thyro-pituitary relationship was obtained until recently when Loeb[31] noticed that an anterior pituitary extract caused hypertrophy of the thyroid, and the work of Adler, Allen, and Spaul,[32] showed that amphibian metamorphosis could be produced by anterior lobe extracts as well as thyroxin. This suggested the presence of a thyroid stimulating factor of the hypophysis, especially since Smith proved that thyroid atrophy following hypophysectomy could be prevented by anterior lobe transplants. This thyreotropic hormone has now been obtained quite free of other known pituitary hormones[33, 34, 35] and is capable of producing a histological picture quite typical of that obtained in exopthalmic goiter. It is quite probable that further investigation in this field will do much to remove our present ignorance of the etiology of hyperthyroidism. It is also to be hoped that eventually an inhibiting factor for the thyroid, or for the thyreotropic hormone, will be discovered, so that instead of our present unphysiological treatment of hyperthyroidism, surgical excision, we will be able to regulate the function of this gland at will. In fact, this inhibiting substance may already have been obtained.[36]

(4) The lactogenic hormone.

Early work indicated that the pituitary contained a galactagogue[37] but these results were undoubtedly due to the stimulating effect of the posterior lobe on the smooth muscle of the gland, producing merely a temporary increase in milk flow.[38] In 1928, Stricker and Grueter[39] induced lactation in female rabbits, previously subjected to sterile copulation,

by the injection of an aqueous extract of the anterior lobe. In 1930, Corner[40] produced lactation in castrated virgin female rabbits by means of a hypophyseal extract. Later Riddle repeated these results with a fairly pure extract in the castrated male rabbit, following injections of the female sex hormone and progestin to produce breast development, and Collip[41] was able to inhibit lactation in the rat by hypophysectomy. E. I. Evans[42] succeeded in initiating lactation for nine months, in virgin and dry goats, by the subcutaneous injection of an alkaline extract of the anterior pituitary for six successive days. This would suggest that lactation is a trigger mechanism; once started by the secretion, or injection, of the lactogenic hormone, it proceeds for a definite interval, under the nervous stimulation of suckling or milking. These results have been practically duplicated in cows and bitches. The administration of this hormone to a lactating cow may easily raise the milk production to a level 50 per cent higher than previously, but only upon continued administration.

It now appears that the stimulus causing the anterior pituitary to secrete this lactogenic hormone, is a sudden diminution in the amount of female sex hormone in the body, as normally produced by removal of the placenta at parturition.[43] When the placenta is retained and continues secreting the female sex hormone, lactation is usually inhibited.[25, 44] Our ideas concerning the physiology of lactation have been somewhat disturbed by the recent discovery that distention of the uterus, as by paraffin, inhibits lactation in rats,[45] presumably by a nervous reflex. This factor may be concerned in the failure of patients with paraplegia to lactate following delivery.[46] The clinical application of one type of anterior lobe extract has had favorable results.[47] There is certainly no evidence that various proprietary galactagogues such as dried mammary substance, have any value. This hormone may be obtained in the form of *Prolactin* (Squibb), according to the method of Riddle and Bates. It is standardized by its ability to increase the weight of the crop gland of immature pigeons, and its potency is expressed in bird units.

(5) The diabetogenic hormone.

Ever since the discovery of insulin, the medical profession has been laboring under the delusion that it understood the etiology of diabetes mellitus. Due to more recent investigations, however, we now have a better insight into our condition. Borchardt[48] had reported as early as 1908 that the injection of pituitary extracts produced glycosuria in rabbits, but definite proof that the pituitary plays an important part in carbohydrate metabolism was not available until Houssay reported that hypophysectomy markedly alleviated the diabetes resulting from complete pancreatectomy, and prolonged the life of the animals. The hormone responsible for this effect was not isolated in a potent form, however, until 1932. Then, as often happens, this discovery was made simultaneously and independently in three laboratories, by Houssay,[49] E. I. Evans,[50] and Barnes,[51] but with priority in publication accorded to Houssay. These three investigators found that injections of anterior lobe extracts into normal animals produced symptoms of diabetes, and at the present time we know that a severe and typical diabetic syndrome may be produced in this way, which ceases when the injections are discontinued. In fact, this diabetogenic hormone will produce more marked symptoms of diabetes in a normal animal than will complete pancreatectomy. Apparently this pituitary hormone inhibits the metabolism of glucose, perhaps by direct action on the tissues, and may thus function as a brake on the action of insulin. In the absence of insulin, as in a complete diabetic, the unantagonized action of this diabetogenic hormone makes sugar metabolism practically impossible. If the anterior pituitary be removed, this inhibiting factor is then absent, and carbohydrate metabolism proceeds by some mechanism other than pancreatic insulin. These new findings undoubtedly explain the glycosuria or lowered glucose tolerance frequently accompanying certain pituitary dysfunctions, as acromegaly.

Furthermore, removal of most of the adrenal tissue alleviates the diabetes resulting from pancreatectomy,[52] and injection of the diabetogenic hormone into an adrenalectomized animal does not produce the characteristic hyperglycaemia.[53] This indicates that this carbohydrate hormone of the anterior hypophysis may produce its effects via the cortical hormone of the adrenals.

(6) The adrenotropic hormone.

Collip et al[54] report that the adrenal atrophy following hypophysectomy may be prevented by the

injection of an anterior pituitary extract, indicating the existence of a specific adrenotropic hormone.

Extracts of the entire anterior lobe are available such as *Anterior-lobe Pituitary Extract* (Mulford) and *Antuitrin* (Parke, Davis), but since these are apparently not subjected to any bio-assays for the various pituitary hormones, their value is problematical. Certainly the therapeutic value of the desiccated pituitary extracts by mouth is extremely doubtful. Witness the statement of the Council on Pharmacy and Chemistry of the American Medical Association that "The Council holds that extensive clinical trial has failed to establish the value of desiccated pituitary preparations for oral administration."[55] It is now incumbent for the manufactors of the various pituitary hormones to prove that their preparations, besides being active, do not contain the diabetogenic hormone. Otherwise, one may well hesitate to use the preparations for fear of producing serious disturbance in carbohydrate metabolism.

The recognition of the various hormones of the pituitary gland has enabled us to analyze the many concomitant symptoms of various pituitary dysfunctions. For example, we may now postulate that an overgrowth of the pituitary cells producing the growth hormone will so markedly increase the secretion of this substance as to produce acromegaly or gigantism, yet at the same time, perhaps by pressure, interfere with this function of those cells producing the gonadotropic, thyreotropic, and diabetogenic hormones, thus causing those sexual and metabolic disturbances seen in acromegaly. It is indeed difficult to understand from what types of cells of the anterior pituitary these various hormones come, for at the present time only three cell types are recognized: eosinophilic, basophilic, and chromophobic. Possibly one kind of cell produces several hormones.

The whole secret of the anterior pituitary is certainly not yet elucidated, and it seems probable that other hormones will eventually be isolated.

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A RESUME OF FIVE HUNDRED CONSECUTIVE PITUITARY CASES OCCURRING IN GENERAL NEUROLOGICAL PRACTICE.*

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Here are presented five hundred consecutive cases of pituitary disorder taken from our private office files for the last twelve years. Doubtful cases and those in which some other diagnosis overshadowed that of pituitary disturbance were not included. X-ray evidence of a small, large, deformed or bridged sella was confirmatory of the diagnosis of pituitary disturbance in 421 or 95 per cent of the 442 or 88.4 per cent cases radiographed by Dr. D. D. Talley. In the twenty-one negative cases it was assumed that atrophic, strumous or other morphological changes had taken place in the pituitary cells and had not produced demonstrable bone structure changes.

Previous to twenty-five years ago, practically nothing was known of pituitary disorders except that Dercum had described adiposis dolorosa and others had contributed to our knowledge of acromegaly. In 1913 Cushing published his epoch-making book.

The sella turcica has been shown in the average adult, when the tube is thirty inches from the film, to be about 11 mm. in its horizontal (anterior-posterior) diameter, 8 mm. in its vertical diameter and that the outlet between the tips of the anterior and posterior clinoids should be from 3 to 5 mm. It has been shown that the square area of the sella in the sagittal plane is usually about one three-hundredths of the area of the skull in the same plane. The size and shape of the sella vary somewhat as to age, race and shape of the skull. The gland contained in the sella consists of two small lobes and of an infundibulum which is of the same histological structure as the posterior lobe. The secretions of the anterior lobe and of the posterior lobe together with the infundibulum, are different and distinct in function. In gross, that of the anterior lobe has to do with skeletal and sexual development, while that of the posterior lobe has to do with involuntary muscle stability and body metalobism, especially fat. Pathologically, the gland may be affected by hypertrophy, atrophy, vascular congestion, fibrous change, tumor, cystic formation or by inflammation. Clinically, physiologic or disease disturbance of the gland may account for, or largely account for, such varied conditions as Frolich's adiposis dystrophia genitalis, other adiposities, the form and shape of the long bones, acromegaly, giantism, diabetes insipidus, changes in sugar tolerance, convulsive states, personality change, nervous, mental and emotional status, conduct disturbance, growth and development, sex characteristics, fatigability, blood vessel and uterine inertia, a definite form of headache, abdominal and superficial pain and many other things.

*Read before the sixty-fourth annual session of the Medical Society of Virginia, at Lynchburg, Va., October 24-26, 1933.

SEX

The sex instance was nearly evenly divided:

Male	266	53.2%
Female	234	46.8%

AGE

The youngest of these cases was two years of age and the eldest sixty-four years of age.

Pre-adolescent cases		
Birth to 10 years inclusive	39	7.8%
Adolescent cases		
10 to 25 years	281	56.2%
Maturity		
25 to 50 years	170	34.0%
Old age		
Above 50 years	10	2.0%
	500	

Thus we see that pituitary disturbance occurs most commonly in adolescence. This statement is enhanced when it is realized that of the 170 maturity cases the great majority were nearer twenty-five years of age than fifty.

Referring again to the types of pituitary disorders verified by roentgenographic study, the 442 cases are divided as follows:

Those showing evidence of hypopituitarism	317	71.7%
Those showing evidence of hyperituitarism	84	19.0%
Those showing dyspituitarism	20	4.5%
Negative (one of these cases had a pituitary tumor)	21	4.7%

BASAL METABOLISM TESTS

A basal metabolism test was made on 119 patients who had distinctly *hypopituitary* sellae—with the following results (first satisfactory test used):

Basal metabolic rate—Normal group—		
Zero basals	3	2.5%
—1 to —10	41	34.4%
+1 to +10	19	15.9%
Diminished —10 & below	38	31.9%
Increased +10 & above	18	15.1%

Thus we see that there were:

Toward the + side	37 cases	31%
Toward the — side	79 cases	66.3%

Considering the basal metabolism tests in thirty-one cases who had a distinctly *hyperpituitary* sella, we had the following results:

Basal metabolic rate—Normal group—		
Zero basals	5	16.1%
—1 to —10	7	22.5%
+1 to +10	11	35.5%
Diminished —10 & below	6	19.3%
Increased +10 & above	2	6.4%

Thus we see that there were:

Toward the + side	13 cases	41.9%
Toward the — side	13 cases	41.8%

Summing up the basal metabolism tests, individuals with hypopituitary sellae appear to be inclined to have decreased basal metabolic rates, while those with hyperpituitary sellae show no definite basal metabolic inclination.

BLOOD CALCIUM TESTS

Considering the blood calcium content in patients with definitely *hypopituitary* sellae, fifty-nine cases so tested revealed the following:

Blood calcium below 9	21	35.5%
Blood calcium above 11	8	13.5%
Normal blood calcium between 9-11	30	50.8%

Those patients in eighteen cases tested who presented definitely *hyperpituitary* sellae showed:

Blood calcium below 9	9	50.0%
Blood calcium above 11	1	5.5%
Normal blood calcium between 9-11	8	44.4%

Thus we see that according to these figures whereas the blood calcium is within normal limits in approximately half of each group, in the other half it tends to be low in both the hypo- and the hyper-cases.

BLOOD SUGAR TESTS

The blood sugar was tested in 104 of the cases which gave definite X-ray evidence of *hypopituitary* sellae, with results as follows: (Method: Folin and Wu.)

Blood sugar below 90	28	27.0%
Blood sugar above 110	20	19.2%
Blood sugar between 90-110	56	53.8%

Those patients with *hyperpituitary* sellae in twenty-two cases tested showed:

Blood sugar below 90	1	4.5%
Blood sugar above 110	10	45.4%
Blood sugar between 90-110	11	50.0%

Thus we see that in approximately half the cases of both groups the blood sugar was within normal limits, while in the hypo-group there was a tendency for the blood sugar to be somewhat low and in the hyper-group a decided tendency to be increased.

CONVULSIONS

One hundred and forty-four of the 500 cases had recurrent convulsions. These cases were considered from the standpoint of X-ray of the sellae, as follows:

Hypopituitary type sellae	104	72.2%
Hyperpituitary type sellae	14	9.7%
Transitional type sellae	7	4.8%
Unclassified sellae (2 tumor cases and 1 encephalitis)	3	2.0%
Normal sellae	6	4.1%
No X-ray taken	10	6.9%

In 1914[1] and several times thereafter I reported cases of recurrent convulsions which I felt should not be designated epilepsy and which were due to under-secretion of the pituitary gland. One of the criteria for this diagnosis was X-ray evidence of a small, crowded or bridged sella, indicating under-secretion of the gland. In the above table, if we eliminate the ten cases in which no X-ray was taken —the three cases of tumor and encephalitis and the seven cases of transitional sella changes,—we have left 124 cases in which twenty cases (the normal and hyper-type sellae) did not conform to that criterion. In analyzing this situation I looked up carefully the fourteen hyper-type sella cases with the following results:

	Attacks Began During Adolescence (10 to 25)	*Clinical Evidence of Hypopituitarism*	*Additional Findings*	*Remarks*
Case 1	Yes, 11 yrs.	Yes	X-ray indicated increased intracranial pressure.	Cannot account for hypersella.
Case 2	No, 6 yrs.	No	Bad heredity; chronic interstitial trouble	Attacks should not be classed as pituitary.
Case 3	Yes, 14 yrs.	Polyglandular	Insane moron.	Attacks should not be classed as pituitary.
Case 4	Yes, 11 yrs.	Yes	Contracted visual field one eye.	Cannot account for hypersella.
Case 5	Yes, 19 yrs.	No	Attacks not true convulsions.	Attacks proved hysterical.
Case 6	Yes, 18 yrs.	No	Attacks lasted several hours; not true convulsions.	Attacks proved hysterical.
Case 7	Yes, 21 yrs.	No	Vertigo.	Attacks proved Meniere's disease.
Case 8	Yes, 14 yrs.	Yes	Temporal contraction of fields.	Cannot account for hypersella.
Case 9	No, 6 yrs.	None marked		Essential epilepsy.
Case 10	Yes, 17 yrs.	Slight	Attacks last several hours; BMR +19.	Attacks functional.
Case 11	No, 8 yrs.	Yes	Much over-weight	Cannot account for hypersella.
Case 12	No, 25 yrs.	No	Brilliant mind; depressed spells.	No true convulsions.
Case 13	No, 9 yrs.	No	No clinical hyper-symptoms; mentally backward.	Probably essential epilepsy.
Case 14	No, 46 yrs.	No	Encephalitis.	Attacks due to encephalitis.

In this analysis we see that seven cases began in adolescence, six cases showed some clinical evidence of hypopituitarism despite the X-ray findings of the hyperpituitary type of sella, five cases showed definite evidence of neurological symptoms, eight cases showed evidence of hereditary or constitutional symptoms, and one case was essential epilepsy. Therefore, I believe we are justified in discarding all of the fourteen cases from the standpoint of the convulsions being due to under-secretion of the pituitary gland. Two cases which showed contraction of the visual fields may have had a pituitary tumor but other diagnostic evidence of tumor was wanting.

In this group of cases the variation from the normal calcium and sugar content and basal metabolic rate is not particularly marked, only about half showing a change.

Of the blood calcium examinations on these cases, 38 per cent were diminished, while 12 per cent were increased. The blood sugar was diminished in 36 per cent and increased in 16 per cent. The basal metabolic rate was diminished in 36 per cent and increased in 27 per cent, approximately 50 per cent in each examination showing some change from the normal.

Therefore, 104 cases fulfill the requirements of recurrent convulsions as a result of pituitary under-secretion, each case showing X-ray evidence, the attacks beginning in adolescence, and definite clinical evidence of pituitary under-secretion in sixty-seven cases, or 64 per cent, and not so marked clinical evidence in thirty-seven cases, or 36 per cent. The increase or decrease in blood calciums, blood

[1] A Preliminary Discussion of Pituitary Disturbance as Related to Some Cases of Epilepsy, Psychoses, Personality and Other Obscure Problems.—*Southern Medical Journal*, Vol. VII, No. 8, August, 1914.

sugars and basal metabolic rates in recurrent convulsions of hypopituitary origin revealed nothing definite, but were suggestive of metabolic disturbance in slightly over half of the cases.

CONDUCT DISTURBANCES

In considering conduct disturbance, only gross irregularities like stealing, frequent drunkenness, flagrant immorality and running away from home were counted. Cases with insanity were excluded. So considered, there were sixty cases analyzed from the X-ray standpoint as follows:

Hypopituitary sellae	43	71.6%
Hyperpituitary sellae	14	23.3%
Normal sellae	2	3.3%
No X-ray taken	1	1.6%

From this summary we find over two-thirds, or 71 per cent, of these cases show the hypopituitary type of sella, and that fifty-seven, or 95 per cent, of them reveal some abnormal change in the fossa.

The blood calcium determinations done were as follows:

Diminished	4	22%
Increased	3	17%
Normal	11	60%

The blood sugar determinations:

Diminished	9	33%
Increased	7	26%
Normal	11	40%

The basal metabolic rates:

Diminished	11	34%
Increased	3	9%
Normal	18	56%

The clinical signs of hypo- or hyper-pituitarism in this group of sixty cases of conduct disturbance were confirmed by roentgenographic evidence in fifty-seven cases, whereas the blood chemistry and metabolic rates were below or above normal in the neighborhood of half the cases.

RELATED SYMPTOMS

In analyzing the 500 cases for other symptoms, I found the following among the chief complaints:

Headaches	115	23%
Drowsiness	17	3.4%
Fatigue	56	11%
Craving for sweets	7	1.4%
Obesity	27	5.4%
Pain	31	6.2%

When these cases are further studied as to the form of pituitary disorders, we note:

Hypopituitarism		
Headache	93	80%
Drowsiness	15	88%
Fatigue	46	82%
Craving for sweets	7	100%
Obesity	24	85%
Pain	26	83%
Hyperpituitarism		
Headache	16	14%
Drowsiness	2	11.8%
Fatigue	8	14.3%
Craving for sweets	0	---
Obesity	1	3.4%
Pain	4	13%
Dyspituitarism		
Headache	3	2.6%
Drowsiness	0	---
Fatigue	2	3.5%
Craving for sweets	0	---
Obesity	2	7.4%
Pain	1	3.2%
Tumors		
Headache	3	2.6%
(Other symptoms as listed were lacking.)		

In the course of the neurological examination the eyes were observed in 394 cases, thirty-seven cases showing some intraocular pathology and nineteen showing changes in the visual fields. Most of these abnormalities were present in the hypopituitary cases.

ASSOCIATED ENDOCRINE DISORDERS

Associated with these 500 cases I found clinical evidence of imbalance of other endocrine glands in one hundred and thirty-five instances, as detailed below:

Hypothyroidism	87	17.4%
Hyperthyroidism	11	2.2%
Dysthyroidism	3	0.6%
Hypogonadism (both sexes)	25	5.0%
Hypoadrenalism	7	1.4%
Hypopinealism	1	0.2%
Pancreatic insufficiency (diabetes mellitus)	1	0.2%

ASSOCIATED NON-ENDOCRINE DISEASES

I further found, in reviewing the diagnoses, other medical and neurological conditions which were associated with endocrine disturbance.

Medical disease	97	19.4%
Neurological disease		
Functional	195	39.0%
Organic	52	10.4%
(Exclusive of the 104 cases of convulsive states.)		

SUMMARY

I. From the analysis of 500 consecutive cases of pituitary disorder the clinical signs and roentgenographic findings coincide in the majority of the cases, 95 per cent, and together constitute the most reliable basis for diagnosis.

II. The basal metabolic rate shows a decided tendency to be decreased in hypopituitarism. There were an equal number on either side of the zero point in hyperpituitarism. The influence of the other endocrine glands and the difference in the function of the two lobes of the pituitary gland must be considered, as the over-secretion of the anterior

lobe is more frequent than that of the posterior lobe and is believed to have little or nothing to do with metabolism.

III. Blood sugar estimations in the hypopituitary cases did not conform in percentage to the "low sugar, high tolerance" ratio which is generally accepted. The number of examinations, however, is small and not conclusive. The sugar level in hyperpituitarism showed a definite tendency to be increased above the normal. It is beyond the scope of this paper to discuss the intricate role of the pituitary gland in carbohydrate metabolism.

IV. No deduction can be drawn from the blood calcium estimation. Attention, however, is called toward decreased calcium content in hypo- and hyper-pituitarism.

V. The frequency of outstanding symptoms has been discussed, especially noting the large number of convulsive seizures, originating in adolescence, in hypopituitary cases (21 per cent), conduct disturbance (12 per cent), and bitemporal headaches (23 per cent).

VI. Evidence of disorder in other endocrine glands is noticeably present in over 25 per cent of the cases analyzed. This is, of course, expected as it is generally accepted that when one gland is primarily disordered the function of the other ductless glands becomes disturbed.

VII. The frequency of medical and neurological conditions associated with pituitary disturbance is briefly given.

VIII. Closer observation of clinical evidence is desirable, and further research in the biochemical field as an aid in differential diagnosis of endocrine disorders is urged.

212 *West Franklin Street.*

DISCUSSION

DR. FRANK H. REDWOOD, Norfolk: The analysis of 500 cases of pituitary disorders which has been presented by Dr. Tucker is quite interesting. I am sorry, however, that he did not tell us something about the treatment of these conditions and his results of treatment. In my own work I find that treatment as a whole has been very unsatisfactory, due in part, I think, to the patient's lack of cooperation. Only in one type of disorder, viz., pituitary headache, will they cooperate fully, because here they have pain, but when there is a question of some metabolic disorder, particularly obesity, they do not seem to appreciate the importance of continuous observation and treatment.

I was much interested in his calcium determinations on the 124 cases of recurrent convulsions. Since 1927 we have been doing a routine calcium determination on every new office patient. Our conclusions have been, after several thousand tests, that the normal should not be between 9 and 11, but readings below 10 should be considered low. Cases of vasco-motor rhinitis, asthma and hay fever will be benefited by calcium therapy when their readings are below 10, but generally speaking they will not be helped with calcium determinations above 10 mgs. If we consider calcium readings between 9 and 10 mgs. as too low, the calcium determinations in Dr. Tucker's 124 cases of recurrent convulsions probably is of some significance. In my own experience, in the majority of all diseases in which there is an abnormal muscular activity, such as epilepsy, chorea, etc., the calcium will be below 10, and therapy seems to be a rather valuable adjunct in the general management of such cases.

I was particularly interested in his cases of conduct disorders. I think the majority of gross conduct disorders in children will show some endocrine imbalance, chiefly pituitary. This further confirms the statement that our endocrines have a great deal to do with the development of our conduct and our personality.

I would like to call your attention to a new test in the diagnosis of pituitary disease, recently described by Goldzieher and Gordon, of Brooklyn, and spoken of as the specific dynamic action. The basal metabolic rate is determined in the usual way, and the next day a protein meal is given consisting of the whites of three hard boiled eggs, a slice of toast and a cup of plain tea. After two hours rest the basal rate is again determined and the difference between the two readings is the specific dynamic action, which, if positive, is below the arbitrary figure of ten, and, according to the authors, denotes pituitary deficiency.

We should not lose sight of the fact, in speaking of pituitary disorders, of the hormonic action of all endocrine glands, and one gland compensates for the deficient secretion of another. So that at times the clinical picture presents the compensating gland as the offender, when in reality the deficient gland is simply calling for help. It is this close relation of the ductless glands that makes endocrine therapy so difficult and at times disappointing.

Question: I should like to ask Dr. Masters to say something about treatment, if he will.

DR. MASTERS, closing the discussion: Answering the question as to treatment, I think the pituitary gland therapy should be pushed, starting out with two grains (the whole gland, if we feel the case is bilobar). This should be given an hour before meals, which is considered the point of lowest gastric acidity. The extract should be increased up to twelve grains. Experience seems to show that doses above sixteen grains have no effect. If the case shows very marked hypo-symptoms, then I believe the gland product should be given by hypodermic. We start the patient on hypodermic injections, and continue for possibly three or four weeks, after which we put them on the gland extract by mouth. The posterior lobe has been effective in the bitemporal headaches, which are sometimes rather distressing to the patient. I think the results, while of course not perfect, have been reasonably gratifying.

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PELLAGRA.*

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In talking about pellagra, I must first say a few words about nutrition in general since the two subjects are closely related.

Malnutrition may be the result of a faulty diet or it may occur in the presence of an adequate diet if there is some metabolic upset. The diseases which are properly called "nutritional diseases" are those which occur as a result of a defect in the diet. The diet may be defective in one of two ways: It may contain an excessive amount of the various food elements, or it may be deficient in one or more necessary factors. The body can take care of reasonable dietary excesses without immediate serious damage but we are not equipped to withstand a shortage in any essential food item for any long period of time. For this reason, among others, most dietary researches in the past several years have been concerned with the vitamins.

Vitamins have been compared to the spark plugs of an automobile engine. They represent a small part of the engine but in their absence the engine won't go. The dietary deficiency diseases require a different method of approach from that which we apply to most other diseases. We are inclined to look at disease as due to the presence of some detrimental factor, such as a microbe, a toxin, etc., but with the dietary deficiency diseases we are called on to accept the fact that the etiological factor is an *absence* of something normally present, and proper treatment demands the immediate restoration of this missing factor if the disease is to be cured.

The majority of the workers in nutrition are biochemists and publish their findings under chemical terminology. This makes it difficult for one not familiar with this field to get the essential information in a form suitable for practical use—say, beans and tomatoes. In order to clarify this terminology in regard to pellagra, I will have to briefly run over the list of the vitamins:

Vitamin A prevents xerophthalmia and is found in butter, cream, egg yolk, carrots, yams, liver, cod liver oil, halibut liver oil. Xerophthalmia is a rare disease in this country, and lack of vitamin A does not particularly concern us since everyone seems to secure enough of it.

Vitamin B prevents beriberi, and is found in whole grain cereals, the germ of wheat, the outer coating of rice, beans, peas, leafy vegetables, and yeast. Beriberi is occasionally reported in the United States; a few cases have been found in Virginia.

Vitamin C prevents scurvy, and is found in citrus fruits, cabbage, tomatoes, leafy vegetables, and potatoes. All of you have probably seen cases of infantile scurvy.

Vitamin D prevents rickets, and is found in fish liver oils such as the cod, halibut, and salmon. Rickets is one of our most prevalent dietary deficiency diseases, particularly in our Northern cities.

Vitamin E prevents sterility in guinea pigs but has not been shown to have any definite effect on humans.

There is no vitamin F.

Vitamin G is the last of the list at the present time, and may or may not be identical with the pellagra preventive factor. I prefer to call the food essential, factor or vitamin, which prevents pellagra, the "pellagra preventive vitamin," instead of vitamin G. A question I am frequently asked is: Do you consider vitamin G and the pellagra preventive vitamin identical? The answer is that they may not be the same if your vitamin G is determined by growth test on rats, because the factor which causes rats to grow may not be the one concerned in human pellagra. At the present time, much of the work being done in this country on vitamin G has as its basis the failure of rats to grow on a properly restricted diet. The results of such experiments should not be applied to human pellagra since it is by no means certain that the food factor being tested in this manner is the factor which prevents pellagra. Therefore, in order to avoid confusion, I prefer to use the term "pellagra preventive vitamin." Then when I say that a food does or does not contain the pellagra preventive vitamin, I mean that it has been tested either in the prevention of

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human or canine pellagra. In the present stage of our knowledge, we have no unit for measuring and expressing the pellagra preventive value of a food and it is my opinion that in order to obtain satisfactory and reliable results, experiments must be conducted either on humans or dogs.

Pellagra is by far the most serious dietary deficiency disease in this country. Although rickets is widespread and serious, pellagra causes a greater economic loss since it disables and kills so many adults. For example, in 1930, in North Carolina there were 1037 deaths from pellagra, or six times as many as from typhoid and paratyphoid, four times as many as from diphtheria, twenty times as many as from malaria, and about two and one-half times as many as from these diseases combined. In this country in 1931, 5853 deaths from pellagra were reported, and, since the death rate of the endemic disease probably does not exceed about 3 per cent, this represents about 150,000 cases of pellagra. When we consider that we have the knowledge which would prevent practically all of this illness if it could be applied, it is time for us to look the situation over.

Let us first look at the geographical distribution of the disease in this country. Of course, sporadic cases of pellagra occur all over the country, in people who take a restricted diet either as a result of some dietary fad or through food idiosyncracies. More than 90 per cent of the deaths from pellagra occur in the Southern States (from Virginia through Texas), but this does not tell the whole story. It is not distributed evenly throughout these states. Pellagra is essentially a rural disease; it never has been a problem in the large cities of the South. In our cities, cases are found associated with chronic alcoholism where the food intake has been greatly restricted, and a few cases are associated with diseases of the gastrointestinal tract which interfere with the utilization of food. Cases such as these may, and do, occur anywhere. The cases with which I will deal in this paper may be regarded as endemic pellagra in that they occur year after year in the same sections and involve large numbers of people. Let us look at the distribution of the disease in Virginia: In 1932, there were 500 cases reported. Of these, 45 per cent occurred in six counties, namely, Henry, Lee, Patrick, Smyth, Washington, and Wise. Lee county leads the state with ninety-two reported cases, or almost one-fifth of the number reported for the State. If we take North Carolina for the first eight months of this year, there were 717 reported cases. Of these, 48 per cent occurred in seven counties, namely, Alexander, Bladen, Guilford, Mecklenburg, Richmond, Robeson, and Wayne. If we looked at the rest of the Southern States we would see a similar irregular distribution. What is the cause of this peculiar distribution, what factor do we find common to all of these areas of high pellagra incidence? It is a restricted food supply. We find that these sections are engaged primarily in raising non-food crops, such as cotton and tobacco, or they contain rural industrial communities, such as cotton mill villages or mining towns. Pellagra is not a problem in rural sections devoted to the raising of livestock or food crops.

Another striking peculiarity of the endemic disease is its seasonal variation. In this country it is strictly a disease of early spring and summer. A study of this feature of the disease has shown that pellagra begins to increase in the early spring and reaches a peak in the month of June when almost 40 per cent of the cases have their onset. What is the cause of this great seasonal variation? The answer again is a variation in the diet. A study was made of the diet by months, and the striking thing is the great increase in the consumption of milk, fresh vegetables and fruits coinciding with the disappearance of pellagra and, of course, the decrease in these same items during the season preceding and during the pellagra increase.

There is one other factor of importance in the occurrence of endemic pellagra, and this is the economic condition. Usually, pellagra incidence is low during years of relatively high income, and high during years of low income. It must be kept in mind, however, that this is only true where the economic changes affect the diet so as to decrease or remove those items which furnish the pellagra preventive factor. Under some circumstances, economic depression may even improve the food supply in this respect. The present depression has effectively demonstrated this factor. In the early days of the depression, when the price of cotton went below the cost of production, the first effect was a curtailment in the food supply, particularly of the small or tenant farmer, with a resultant increase in pellagra. However, as the price of cotton continued low and credit became more restricted

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it became absolutely necessary to produce a greater quantity and variety of food at home, which caused the diet to become more liberal and a marked reduction in pellagra incidence followed. Thus, in North Carolina the reported deaths from pellagra increased steadily to the high figure of 1031 in 1930, and fell in 1932 to 465. Thus the depression, which originally caused an increase in pellagra, through its severity and long continuation has now led to a more liberal diet, with a marked reduction in the occurrence of pellagra.

Although these studies give valuable indications as to the factors which influence the incidence of pellagra they only further strengthen and confirm more direct experimental evidence. Goldberger and his associates organized and carried out a complete series of human experiments, the results of which determined beyond any reasonable doubt the relationship of diet to pellagra. There were three questions which were answered by experimentation: 1. Can the disease be prevented by diet alone? 2. Can the disease be produced by a deficient diet? 3. Can the disease be cured by feeding a proper diet? In securing the answers to these questions it was proven by experiment with the human disease that it is due to a diet deficient in a specific dietary essential, or vitamin.

The first observations on the question of prevention were made in three large orphanages and a portion of a large insane asylum over a period of three years. Four hundred and fourteen individuals who had had pellagra were observed. The only change made in these institutions was the addition of meat, milk and legumes to the diet. There was one recurrence within this group as compared with a recurrence of 47 per cent in a control group of thirty-two persons maintained on the original institution diet. In one institution, a return to the original institution diet following the study caused an incidence of pellagra of approximately 40 per cent in less than a year. Return to the modified diet was again followed by complete disappearance of the disease over a period of observation of fourteen months. Although the results of this experiment alone are sufficient to rule out the possibility of infection, an attempt was made to transmit the disease from advanced cases of pellagra to healthy human volunteers by means of blood and excreta. All of these attempts failed.

Using a diet of the same general composition as that upon which pellagra had occurred in the institution, the disease was experimentally produced in six out of eleven volunteers. Later, in connection with experiments on epilepsy, Walker and Wheeler experimentally produced the disease with a similar diet in seventeen of eighteen epileptics, while a control group of fifteen individuals ate the same diet with the addition of turnip greens for one year without a single case of pellagra occurring in the group.

Having determined that the disease can be produced at will in any number of individuals on a properly restricted diet within a period of about six months, the Public Health Service workers undertook a long series of preventive tests which have now exceeded 300 individual tests on twenty-three different foods.

These tests furnish us with considerable data on the etiology of the disease. They were conducted by using a basal diet similar to the one which produced experimental pellagra to which the indicated quantity of the foodstuff to be tested was added. If pellagra occurred in the group in spite of the supplement, it was concluded that the food in question added little or none of the pellagra preventive factor. If no pellagra occurred in the group in the course of an entire year on the diet, it was concluded that the foodstuff, in the quantity used, was a satisfactory source of the pellagra preventive vitamin. With this method of testing it has been found that the pellagra preventive vitamin is unequally distributed in a wide variety of food stuffs and bears no relationship to the distribution of any other known vitamin. The tests have been conducted with a large variety of foodstuffs and have furnished us with reliable and accurate information on the actual pellagra preventive value of foods. Although this factor, or vitamin, has not been isolated, and its mode of action in preventing the disease is not known, the information given here as to its distribution in various foods is the essential data needed for the prevention and treatment of the disease.

In addition to these human experiments, extensive experimental work on dogs has given us additional valuable information. Those of you who have had any wide experience with hunting dogs in the South have in all probability come across cases of blacktongue. Blacktongue of dogs is the analogue of pellagra in humans. It may be pro-

duced at will by feeding a properly restricted diet and it may be prevented or cured by correcting the diet. Our method of experimentation with dogs is to add the article of food to be tested to a diet which we know will produce blacktongue. If no blacktongue occurs in one year it is concluded that the food is a good source of the preventive factor. These results are then checked, if possible, on human pellagra. Using this method of testing, we have determined the pellagra preventive value of a considerable number of foods. The success or failure of your treatment of pellagra depends on how successful you are in getting these protective foods into the patient. A considerable number of foods have been tested and found to have such little pellagra preventive value that they are worthless regardless of the quantity or combination used. Some of these foods are cornmeal, white flour, oatmeal, molasses, butter, lard, fat salt pork, carrots, onions, turnips, and sweet potatoes. The more important foods which have been proven by test to be most valuable in pellagra are milk, including buttermilk, skim milk and evaporated milk; lean meats and fish, including beef, pork shoulder, liver, canned corned beef, canned salmon and haddock; vegetables, including turnip greens, tomato juice, green peas, collards, kale, spinach, green cabbage, and green beans. Yeast and wheat germ have been found to be rich in the pillagra preventive vitamin.

Yeast is the richest source we now know of the pellagra preventive factor and is therefore very valuable in treatment and prevention. By yeast, however, I do not mean yeast cakes but a pure dried yeast, either brewers' or bakers'. The yeast in yeast cakes is all right but the quantity is too small. I am often asked if there is any difference in the pellagra preventive value of brewers' and bakers' yeast. So far as we know there is no appreciable difference as long as a pure, unadulterated yeast is used.

The present depression has shown us the way to the prevention of endemic pellagra in this country. What is necessary is nothing more nor less than a change in the dietary habits of a large section of the population. Practically, this is an exceedingly difficult thing to bring about, but by proper education it can be done eventually. The depression forced the production of food crops with a corresponding change in diet in the right direction. Some of this land in all probability will never go back to cotton but it is safe to predict that when the production of cotton becomes barely profitable and more acreage is turned to its production there will be another increase in pellagra.

Pellagra presents little difficulty in diagnosis after a few cases have been studied. The syndrome is so typical that it should not be confused with anything else. It has been taught that the diagnosis of pellagra rests on the three d's—diarrhea, dermatitis, and dementia. This is a neat little phrase but there are two things wrong with it—it is incorrect and it doesn't tell the whole story. Many cases of pellagra don't have diarrhea, only about 4 per cent progress to the stage of dementia, and some do not have dermatitis. This phrase also omits two important manifestations of the disease, namely, stomatitis, which occurs very frequently, and paresthesia.

In treatment, drugs are useless. Success or failure depends on the diet used. A large percentage of cases show a diminution or absence of hydrochloric acid in the gastric juice; therefore the administration of dilute hydrochloric acid may be indicated to improve digestion. A suitable mouth wash is indicated for the stomatitis. Other than this, treatment is purely dietary. I have already given you a list of the foods which contain the vitamin and I have mentioned the value of dried yeast which should be given in large doses. You can't afford to fool around with a few tablets—the patient should get one-half ounce of yeast a day if a child, and one ounce a day if an adult. It may be given in milk, tomato juice, broth, or just suspended in water. This quantity should be divided into three or more doses during the day. More important even than the use of yeast is the correction of the diet. Milk should be given freely. Although it is not one of the richest sources of the vitamin, its ease of digestion enables the patient to handle quantities of it satisfactorily when solid food cannot be taken. If there is severe vomiting, food must be given in small quantities at frequent intervals, and more reliance placed on milk and meat broths and juices. Lean meats and liver are two additional sources of the vitamin that should be used freely and the vegetable side of the diet made up of vegetables containing the vitamin. It is desirable to have the patient in a hospital because of the better control that can be maintained over the diet. However, you can't put the patient to

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bed and simply order a high vitamin diet. If you do, he will get, most likely, orange juice, lettuce and cod liver oil in large quantities, and you might as well throw the cod liver oil out the window as far as pellagra is concerned. The particular items of food required must be specifically ordered and it should be seen that they actually go down the patient's throat—and stay down. I know of cases in which the physician has said that the patient had pellagra in spite of milk, lean meat, etc., but on investigation it was found that, although these foods were served, the patient didn't care for them and ate only the bread, grits and gravy and sent the rest back to the kitchen.

If the patient must be treated at home it is more important than ever to closely supervise what he eats. It is useless to *order* lean meat and milk for a family that has no means of obtaining such food. It is up to you to see that the diet in that household is actually improved in the proper way. Your mortality rate will depend largely on your ingenuity in getting the patient to take the necessary foods. And, finally, let me caution you once more about putting your faith in drugs. There is no drug in the pharmacopoeia which is of the slightest value in the actual cure of the disease.

THE TREATMENT OF PELLAGRA—A CRITICAL REVIEW.*

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The theories of the toxic and infectious nature of pellagra have been largely discarded since the important contributions of Joseph Goldberger and his associates. The experimental production of pellagra in humans by means of dietary restriction alone has established that pellagra is primarily a deficiency disease. In 1915, Goldberger and Wheeler[1] produced pellagra in six out of eleven convicts by restricting their diet consisting principally of maize products. The dermatitis in these cases was not entirely typical and some authorities[2] questioned whether the disease produced was actually pellagra. However, Walker and Wheeler,[3] while investigating the effect of prolonged administration of a diet low in the pellagra-preventive factor on epilepsy, produced pellagra with typical dermatitis in seventeen of their eighteen subjects, thus demonstrating beyond question that a diet lacking in certain substances could produce the disease.

In 1923, it was reported that pellagra could be prevented by a proper diet. Goldberger, Waring and Tanner[4] studied the effects of dietary changes in a large number of institutional inmates over a period of several years. They found that on the original institutional diets about 60 per cent of the inmates had been afflicted with pellagra. A well-balanced diet was provided, and during a three-year period there was no new case and only one recurrence. The original diet was then resumed and pellagra recurred in about 40 per cent of the inmates. When the balanced diet was once more started, symptoms of pellagra disappeared and no new cases developed. This study proved that a proper diet would prevent pellagra, but no effort was made in it to determine what food substances were specifically prophylactic.

Numerous foodstuffs were tested for their pellagra-preventive properties in a series of subsequent investigations. In 1925, Goldberger and associates[5, 6] found that pellagra could be prevented by the addition of dried brewers' yeast to an otherwise deficient diet. The "P-P" factor was the name first given to this pellagra-preventive substances in yeast. It has since been identified in many other foods, and it is now classified as vitamin G (or B2). It is practically absent in refined products such as cornmeal, wheat flour, oatmeal, molasses and cane syrup.[7-8] Yeast, liver, lean meat and meat-extracts have been found to be rich sources of vitamin G; milk, eggs, and vegetables contain sufficient vitamin to be pellagra-preventive when given in reasonably large quantities.

Therapeutic studies are difficult to evaluate in a disease which so often seems to improve without

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treatment. For years the remissions in pellagra have been considered to be spontaneous, but, in view of modern work, it appears more likely that these so-called spontaneous remissions are really due to an unrecognized addition of vitamin G to the diet. Spies,[9] in a recent observation which apparently favors the spontaneous nature of the remissions, noted disappearance of the dermatitis in hospitalized pellagrins while they were maintained on a diet known to be deficient in vitamin G. But Ruffin and Smith[10] carried this observation one step further and found that the dermatitis in such instances returned on re-exposure of the skin to sunlight, unless meanwhile vitamin G had been supplied. This latter work suggests that solar radiations may be partially responsible for the skin lesions in patients made susceptible by deficient diet. Both Spies, and Ruffin and Smith reported that there was no other improvement in the symptoms of pellagra until vitamin G was added to the diet. Spies' study, therefore, constitutes further evidence that the remissions in pellagra are not spontaneous in origin. Ruffin and Smith, and Walker and Wheeler,[3] observed prompt improvement of all symptoms of pellagra in a few cases as soon as known deficient diets were replaced by balanced diets. This is proof that a balanced diet alone is therapeutically active and its points out the necessity for careful dietary control in all therapeutic experiments.

The ideal situation for studying the effect of a particular substance in the treatment of pellagra necessitates the maintenance of the subject on a diet deficient in vitamin G (but adequate in all other respects) while the effect of that substance is being tested. If this method cannot be used, it is essential at least that the experimental and control subjects be given identical diets before interpreting the specific therapeutic activity of any supplement. The results of studies on the value of arsphenamine,[11] sodium thiosulphate,[12] iron,[13] lime water,[14] insulin,[15] typhoid vaccine,[16] boiled lean ham meat[17] and animal fats[18] in the treatment of pellagra are entirely inconclusive because these investigations have been improperly controlled. Ridlon's study,[19] in 1916, demonstrated that when a well-balanced diet was provided, the drugs in common use for pellagra at that time were of no additional benefit.

Various forms of yeast and liver have been studied for their curative value in pellagra. Goldberger and Wheeler found in their work on the prophylactic value of yeast that active cases of pellagra improved on a diet in which dried brewers' yeast furnished nearly all of the vitamin G. Walker and Wheeler were able to show that the pellagra produced in five of their epileptics by dietary restriction, was completely cured when yeast alone supplemented the diet which caused the disease. This seems to be conclusive proof that yeast may be specifically curative when other sources of vitamin G are inadequate. There has only been one clinical report in America on the value of yeast in therapy. Carley[20] recorded excellent results in a large series of ambulant pellagrins treated with dried brewers' yeast, but since no dietary control had been attempted in these cases, he remarked that conclusions were not warranted about the value of the yeast.

Because yeast is effective when the diet is deficient in vitamin G, it does not follow necessarily that it is beneficial when a well-balanced diet is provided. The author[21] has recently compared two groups of hospitalized cases, both of which received a high vitamin diet. One group was given yeast in addition to this diet, and no definite cumulative effect from its administration was observed. The lack of an added improvement in the yeast-treated cases suggests that only a limited amount of vitamin G can be utilized in the human body. Yeast is cheap and there is no objection to using it as a supplement to insure an abundance of available vitamin G, but its administration together with a well-balanced diet cannot be considered as necessary in routine treatment.

Liver has lately been employed as a source of vitamin G in pellagra therapy. Ruffin and Smith demonstrated that the oral administration of an aqueous extract of liver was therapeutically active by showing that pellagrins on a special restricted diet did not improve until the extract was given. All then responded promptly. These authors found that on the same diet, there was no beneficial effect from intramuscular administration of Liver Extract No. 343 in doses of 5 c.c. daily It remains to be determined whether liver preparations are advantageous when a balanced diet is available.

A major difficulty in treating pellagra is to supply vitamin G to cases with severe vomiting and diarrhea. The problem might be answered by a

practical method of administering the vitamin parenterally. Ramsdell and Magness[22] reported favorably on the use of intramuscular injection of 2 c.c. daily of Liver Extract No. 343, but since their twenty-two patients were at the same time receiving a balanced diet, it seems, from the work of Ruffin and Smith, that the benefit was more probably attributable to the diet than to the liver injections. More impressive is the work of Spies,[23] who prepared a solution of wheat germ, high in vitamin G content, and administered it intravenously to a small series of pellagrins who were kept on a vitamin G deficient diet. They all improved promptly. Next, he gave the same solution to four pellagrins who, because they were vomiting, were given nothing by mouth for several days. The vomiting soon ceased, and their appetites returned and they made uneventful recoveries. An effective parenteral method of giving vitamin G would be a great advance in the treatment of pellagrins with severe gastrointestinal disturbances.

The treatment of pellagra has been complicated by a large number of unscientific observations. A review of the few well-controlled studies seems to establish the following facts: first, pellagra can be produced by a diet deficient in vitamin G, and it can be prevented by a well-balanced diet or by any substance rich in vitamin G; second, some cases of pellagra can be cured by a well-balanced diet or by individual substances such as yeast and aqueous liver extract orally, when such a diet is not available; third, whereas symptomatic remedies are useful, no drug is of proven preventive or curative value in pellagra.

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DISCUSSION

DR. H. B. MULHOLLAND, University: At the University our interest in pellagra was stimulated about six years

ago when we observed that the incidence was increasing out of proportion to the increase in hospital admissions. This was also true in the general population as shown by vital statistics. In the last five years the deaths from pellagra have increased greatly over the preceding five years. Strangely, this increase began in the period of prosperity. Dr. Blackford told me this morning that the deaths last year had decreased, when one would expect them to increase in a period of depression.

Many methods have been tried in the treatment of pellagra, and each one of these methods has been reported to give favorable results. This is probably due to the fact that spontaneous remissions occur, even under the same conditions which apparently result in the development of the disease. It may reoccur the next spring or fall, but the clinical manifestations disappear.

The difficulty in evaluating any treatment of pellagra is the fact that we have not had a yardstick by which to measure it. For instance, in pernicious anemia we have the reticulocyte response, which is an excellent measure of the efficacy of our treatment. In pellagra we have nothing comparable. The work done at Duke University in the prevention of dermatitis by the use of liver extract is encouraging and perhaps will result in the establishment of a reliable method of controlling treatment.

I think, in conclusion, however, one might say that the main and most valuable method of treating pellagra is to give an adequate diet; and that does not mean simply an average adequate diet, because it is quite probable that patients who develop pellagra are not able to assimilate enough vitamin from the average diet but need a surplus of vitamins in the diet.

LESIONS OF THE CERVIX UTERI.*

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In recent years the cervix uteri is claiming attention of the profession to a greater extent than ever before.

The diseases affecting the cervix are principally: Laceration, ectropion, inflammation, ulceration, granuloma, nabothian cysts, endocervicitis, myoma, polypus, cancer, chancre, chancroids, syphilitic ulcers, atresia and stenosis.

Laceration of the cervix uteri results from child-birth and forcible dilatation. Following labor there is always more or less laceration. In most cases the laceration heals fairly well if not disturbed by infection. In many cases the infection does not admit of ready healing of lacerations. The torn surfaces granulate and finally heal by the development of cicatrization, but do not heal together. In many cases there develops an ectropion with irritation and chronic inflammation. The symptom most prominent in unhealed laceration and its sequela is leukorrhea, and it is this that sends the patient to a physician. Then it is the duty to carefully examine the patient on a table, both bi-manually and through a speculum, with a good light. Incidentally, every woman who has been delivered should be examined from six to seven weeks after delivery, and at indicated intervals thereafter if the pelvic organs at the time of such examination are not found to be in a satisfactory condition. In this way, and in this way only, can the woman have the assurance that she is well. Thereby, it is possible to prevent future pathology of a more serious nature. A tear in the cervix and the subsequent scar tissue formation cause the ducts of the cervical glands to become obstructed. With the glands continuing to secrete, there is an accumulation of the secretion, which distends the glands, forming little cysts. The chronic inflammation increases the obstruction and the irritation. As a result of the laceration and inflammation, the cervix may become filled with small cysts (cystic degeneration) and very much thickened and quite heavy. The constant over-distention is followed by rupture of the cysts and the discharge of their contents. Inflammation of the cervix includes acute cervicitis, chronic cervicitis (including cystic cervix), erosions, granuloma and ulceration.

Cervicitis may be acute or chronic. Acute cervicitis is usually the result of infection following child-birth or gonorrhea. Chronic cervicitis may follow acute cervicitis or may appear as chronic changes following laceration of the cervix during labor, abortion or instrumental dilatation.

Erosion of the Cervix is a peculiar condition in which the squamous epithelium is replaced by columnar epithelium over certain areas. It is usually seen about the external os and extending outward for a variable distance, giving a red, inflamed ap-

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perance, with a leukorrheal discharge of variable quantity.

Ulcer of the Cervix, like an ulcer elsewhere, is an area from which the epithelium has disappeared, the base of the area being formed by granulation tissue. An ulcer of the cervix may be a simple ulcer, due simply to inflammation, with tissue destruction, or it may be syphilitic, chancroidal, tuberculous or cancerous. Granuloma of the cervix is an elevated. friable dark red mass on the cervix of variable size. It is generally of a dark red color, bleeds easily, and there is much leukorrheal discharge. Along with the above are pelvic and low back pains. It is sometimes quite difficult to differentiate on examination from malignancy. While the super-structure of such lesions is quite friable and bleeds freely, the base is very hard and tough—fibrosis.

Polypus is an elongated red growth that protrudes from the os, or into same. It is attached to one of the lateral walls of the cervical canal, and bleeds easily.

Myoma of the Cervix: Occasionally a myoma (a tumor composed of muscle tissue) arises in the cervix, but most frequently this variety is found in the uterus. It is hard and regular in its feel, and of variable size.

Atresia and Stenosis of the Cervix may be congenital, or may be due to infection, or over-treatment. The cautery, when used too liberally, may be followed by adhesions and cicatrization; atresia and stenosis are the result.

Ectropion of the Cervix accompanies laceration and is an eversion of the cervical lips.

Endocervicitis is an inflammation in the cervical canal, which extends from the ostium to the internal ring. It is a part of the process of inflammation of the cervix, with which it is frequently concurrent.

Cancer of the Cervix is a far more frequent lesion of the cervix than would be suspected by one who has not given the subject special consideration. In a very recent article by Barton Cooke Hirst, many astounding statements are made. For the benefit of all of us, I shall ask your indulgence by quoting in part:

"One of every eight women who reach the age of 35 will have a cancer. The disease ranks second among the causes of death in America. The mortality is increasing, rising from 63 to 96 per hundred thousand in seven years, or more than 50 per cent increase. In fifty American cities during the same time it has increased from 75.1 to 122.7 per hundred thousand. Of cancers in women 25.83 per cent are in the genital organs; 80 per cent of these are in the cervix uteri. Of four women who come to a physician with cancer of the cervix, one may survive. In spite of skilful treatment, *three* will die within five years. The proverbial ounce of prevention is the best treatment of cancer. The late John G. Clarke once said he never saw a cancer in the cervix if it had been successfully repaired. While I couldn't quite agree, but undoubtedly the immediate, intermediate or secondary repair of the cervix after child-birth will usualy prevent a cancer there in later life. The whole problem of securing better results resolves itself, therefore, into the best means of recognizing the disease early."

Unfortunately cancer in the cervix, like cancer elsewhere, causes no pain in the early stage. This is why so many women do not early seek advice and treatment. Frequently it is the case that women with cancer of the cervix disregard bleeding and continue to go blindly along in oblivious desuetude till the cancer is out of bounds before seeking advice.

Cancer is a disease essentially of middle and late life; however, it is not unknown in youth.

About the first symptoms which the woman observes is a spotting or staining between menstrual periods and excessive or prolonged menstrual periods. After the menopause, spotting, staining, bleeding or profuse hemorrhage, constitute the line of march. which ends invariably at the grave when unheeded and untreated.

Any woman who is bleeding, whether it be spotting, staining or flooding, is a candidate for careful investigation. Not every case of bleeding is cancer, but every bleeding should be suspected of cancer till proven otherwise. In this way, and in this way only, will the mortality from cancer be reduced.

Early cancer can be cured; late cancer rarely, if ever. In examining the cervix for cancer, as in every other gynecological examination, the patient should be placed on an examining table and the examiner should have a satisfactory light. Incidentally, a Winchester hunting light is cheap and quite satisfactory; in fact, I have discarded the more elaborate lights and use one nearly all the time.

DIAGNOSIS

The history of bleeding has been discussed, but is so important that it demands repetition. The amount varies from mere spotting or staining after trauma following a douche, intercourse or digital examination (an early symptom) to prolonged or profuse hemorrhage.

A. H. Curtis says: "Hemorrhage from the uterus in a woman definitely beyond the menopause is always to be regarded as positive evidence of cancer until a thorough examination demonstrates conclusively that no malignancy is present. During the child-bearing period this most important symptom loses much of its value, because bleeding may be due to many other causes. After the menopause is well established, however, a cervical polyp is the only other frequent lesion which commonly gives rise to vaginal loss of blood (notable hemorrhage from polypus is unusual). A much less common cause of bleeding at this age is a pedunculated fibroid tumor; the fibroid may appear at the cervix or may be concealed within the uterine cavity."

Digital Examination reveals friable tissue which bleeds freely upon palpation of the cervix. No other objective symptom equals in importance the value of this evidence. Examination with the index finger is preferable to employing two fingers. When the cervix is beyond reach, it may be rendered more accessible to the examining finger by simultaneous insertion of the mid-finger into the rectum—the recto-vaginal method.

The cervix is often enlarged. It seldom attains to more than twice its normal size. Ulceration may be evident. Areas of varied consistency, some unduly firm and some honey-combed, are encountered.

Local extension is characterized by infiltration of the adjacent vaginal wall, parametrium and broad ligaments. Determination of the degree of broad ligament fixation is of the utmost importance; this necessitates careful bimanual palpation with notation of the mobility of the uterus.

One must always have in mind the possibility of a pre-existing thickening. In this way, one may find patients who were formerly regarded as incurable that may respond to treatment. Even those who would appear incurable should be given the chance of cure. Occasionally one will be surprised by a cure in what appears to be a hopeless case.

The speculum should be used, but with a due realization of its limited value; it is to be used, however, in every case examined, and with great gentleness; otherwise, a hemorrhage may follow. Recently a test for the presence of cancer in the cervix was suggested by Shiller, which, according to reports from various clinics, appears to be of great value. Graves, in a report which appeared after his death, was most enthusiastic. The test consists of swabbing the entire cervix and portio-vaginalis with Lugol's solution. Same should be applied with a liberally soaked sponge, beginning anterior to the cervix and allowing the excess to flow over the cervix. The staining, in the absence of cancer, is a smooth, evenly distributed mahogany brown. Cancerous areas do not take the stain. Absence of staining, therefore, is to be regarded as cancer. Graves states that recently healed ulcers do not accept the deep staining of a non-cancerous cervix, although there is some staining of such areas, but they are sharply defined in outline.

In my experience, which up to the present has been quite limited, the test has proven to be accurate. Its simplicity commends it.

Excision of tissue for the establishment of the diagnosis of cancer should not often be necessary, but it is frequently of great value. Tissue may be looped off with an endotherm loop for diagnostic verification. It is well to use a fairly large loop rather than a small one, so that the specimen will not be coagulated, as is sometimes the case when a small loop is used. The advantage of the endotherm lies in the superficial wall coagulation of the excised area; the disadvantage lies in the possible coagulation of the entire specimen (with a small loop). It sometimes happens that the cervix is quite normal in feel and appearance while cancer is present in the cervical canal or in the body of the uterus. If the cervix reveals no cancer, and the history and symptoms indicating a possible malignancy are present, the cervix should be dilated under anaesthesia and scrapings taken for microscopic study. "Non-stained cells give more information than stained specimens," according to A. H. Curtis.

Atresia and stenosis are obvious and quite easily proven. Atresia is discovered at puberty, when the patient fails to menstruate, has all the aura and a mass is found in the supra-pubic region.

Stenosis may be congenital or acquired. Recently, the over-use of the cautery blade in the canal has been responsible for many cases of acquired steno-

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sis. The use of radium in the cervix may be responsible for a similar condition in the event that a proper follow up is not made.

The repair of a laceration is a surgical procedure. The repair may be made immediately following labor, but the procedure is open to serious debate, as any procedure on the cervix immediately following labor adds the additional risk of infection. Immediate repair is indicated in the presence of hemorrhage due to tearing of the circular artery; it is also proper if the tear is extensive and the cervix can be well exposed, and is fairly accessible and with favorable general conditions. Lacerations that have healed over by granulation should be treated by the fine cautery blade, at a cherry red heat, five or six weeks after delivery. In using the cautery blade, great care should be taken not to invade the os beyond the uppermost area of the laceration. The cauterization should extend to the depth of the granulation and from the outer limit of the os to the outer limit of the granulation margin. The lines of the cauterization should be so placed that there is an area of uncauterized tissue about one-quarter to one-third of an inch wide between each of the lines. The tendency is to overdo the procedure at the first sitting. It is much better to repeat the procedure after three or four weeks, if there are still unhealed areas. The patient should always be informed that there will be some discharge following the treatment for at least three weeks. The same method may be used in treating chronic ulceration and granuloma as suggested for granular laceration, which includes ectropion. Nonspecific inflammations are handled in a similar manner. Cysts may be punctured with a cautery point or preferably with the positive pole of a coagulation instrument; still better by using a bipolar tip (in the Cherry holder). The current is so regulated that the cystic area about one-eighth to one-quarter inch will be coagulated. This will usually take about 500 m.a. for about ten seconds. The glands are thus destroyed with their respective retention cysts.

The huge succulent chronic inflammatory cervix which bleeds freely may be cured by using the negative plate of a surgical diathermy outfit on some indifferent part (buttocks, thigh, back or arm) and by inserting the positive pole, needle or tip, in various areas throughout the presenting cervix. One should first decide on the depth and area of coagulation desirable about each insertion. The instrument should be previously adjusted unless one is familiar with the particular instrument in use. This can be determined by testing it on raw beef. The areas coagulated should never be so closely spaced that there is complete destruction of the intervening tissue. There is always destruction of tissue beyond the area of apparent blanching. Following all these procedures there is sloughing of the coagulated tissue for three to four weeks; there is more or less foul odor. At times there may be bleeding as the destroyed tissue separates. The patient should be told this and directed to notify the attending physician if hemorrhage of consequence develops. Following coagulation, in about four weeks the cervix is found to be clean and shrunken, in proportion to the degree of coagulation. All of the above procedures are available, in skilful hands, without anesthesia.

Endocervicitis is generally associated with a cervicitis or an ulceration and an ectropion. The two procedures which offer a cure are (1) coagulation with a Cherry bipolar electrode, or (2) the use of Hyam's conization method. The technique of the Cherry technique consists in using a predetermined amount of current which will coagulate to a depth of one to two m.m.

With the speculum in place and with a proper light, the Cherry electrode is inserted into the cervical canal as far as the internal ring; then withdrawn about one-half to one c.m. The predetermined current is then turned on with a foot switch, while simultaneously the electrode is slowly rotated within the canal. Usually about twenty to thirty seconds is sufficient time. Before turning on the current, it is well to loosen the set screw on speculum enough to allow the cervical lips to contact the electrode. It must be remembered that the electrode must be in the cervix throughout the time when the current is on and that the electrode must not contact the speculum while the current is on; otherwise, a short will occur and an expensive electrode will be burned out, and, if the speculum is contacted, there is danger not only of burning out the electrode but of shocking the patient, which, while inconsequential, may be momentarily disagreeable.

A cervix thus treated heals in three to four weeks and there is no more leukorrhea. Incidently, if there is a cervicitis immediately around the canal, which does not extend more than one and one-half

to two c.m. in any direction, it is likely that this will also be cured by this procedure without further treatment. It is well in such a case to describe a circle with the proximal end of the electrode, so as to contact the os and thereby to coagulate the surface ulcer over a greater area. Usually there is a blanching of one c.m. around the circumference of the os. The patient sometimes complains of a uterine colic for a few seconds during the procedure or immediately thereafter. She should be reassured in such an event.

If the laceration is wide and the os is much inflamed and the cervix enlarged, the Hyam's technique may be used to wonderful advantage. For this the cutting current is used. A negative plate is used at some indifferent place on the body. A special electrode of one of the sizes and designs available is inserted into the cervical canal. The cutting current is switched on and at the same moment the electrode is quickly rotated within the canal in such a way as to cone it out. With this the mucosa is removed with as much of the adjacent wall as may seem desirable. The walls are automatically coagulated enough to stop the bleeding.

This procedure is best done under anesthesia, since this method is not an ordinary office procedure, and is most often associated with some other surgery.

It is better to give either of the two treatments (Cherry or Hyam's) following a menstrual period.

Douches do not cure cervical lesions and the attendant symptomatic leukorrhea; neither do topical applications. The best that can be said for the former is that they temporarily cleanse away some of the discharge.

Insufflated dusting powder is helpful at times in reducing temporarily the profuse foul discharges. Zeroform, 1 part, and boric acid, 3 parts, or kaolin and sodium bicarbonate, equal parts. Alcaroid powder is also useful.

Polypi may be treated through a speculum. The cervix is grasped by a tenaculum or by two tenaculi and drawn down. The base of the polyp may be destroyed with a small cautery at cherry red heat, taking care to protect the walls of the cervix other than the area being treated. The positive pole of a coagulating current of low intensity may be inserted in the base of the pedicle and the current applied for a few seconds. It may be looped off with a cutting current (endotherm).

Myoma must be treated by a method which is determined upon by the location, size of growth, age of patient, and possibly other factors. It is essentially a surgical procedure. A small nodule may be coagulated, if available to such a procedure, or it may be removed by the cutting current.

Carcinoma of the cervix is best treated with radium, which has largely superseded surgery, because the number of cures resulting from its use is conceded to be greater than from surgery. There is practically no immediate mortality from radium, whereas surgery, in the hands of masters, showed an immediate mortality of 10 to 18 per cent, with slightly fewer five-year cures.

The use of radium must be in the hands of those who have a reasonable working knowledge and to whom an adequate amount of radium is available. As before stated, those that are early diagnosed and adequately treated are largely responsible for the five-year cures. Some, however, who appear to be hopeless are cured. Every woman suffering with cancer of the cervix should be given the benefit of whatever possible good we are able to offer. In order not to bring treatment into disrepute, the referring physician, the relatives, and possibly the patient, should be acquainted with the picture that is presented, and made to understand that we are not too hopeful,—but advanced cases which seem hopeless are sometimes cured; that in the event of unfavorable results, radium is not to be stigmatized.

Chancres and chancroids may be found on the cervix, typical or atypical. Late syphilitic ulcers may also be found on the cervix uteri. I have recently seen one that made me quite unhappy. It occurred in a woman whom I had treated for cancer of the cervix two years previously and who had gotten a symptomatic and apparent cure. She appeared with an ulcer on the cervix and portio vaginae which grew larger and showed no response to treatment. In the meantime her husband appeared complaining of hoarseness. He gave, upon questioning, a history of a chancre three months previously. He had a 4 plus Wassermann; so did his wife (who had been previously negative). She was given treatment, the ulcer healed, and she is now symptomatically cured of cancer and syphilis.

CONCLUSIONS

1. All simple lesions of the cervix should be treated and cured; this is now possible.
2. Untreated lesions tend to become cancerous.

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3. Leukorrhea is a symptom of some lesion and is curable.

4. Bleeding out of time always has an answer; bleeding in middle life and thereafter should suggest the possibility of cancer, and should be so regarded till it is ruled out.

5. Excessive bleeding at a regular menstrual period, spotting, staining, and metrorrhagia or any bleeding after the menopause, is a danger signal.

6. To attribute bleeding to the "change of life" and to withhold a careful investigation is unjustifiable negligence.

7. Early cancer does not warn of its presence with pain.

8. If pain were an early symptom of cancer, the death-rate would be extremely low, for pain urges patients to be treated.

215 *Medical Arts Building.*

CARCINOMA OF THE UTERUS.*

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Although known for years, carcinoma of the uterus still remains one of the major problems confronting the medical profession. The frequency of occurrence, the appalling death rate, the inadequacy of treatment, and particularly the importance of early recognition, justifies a short resumé of its outstanding features.

INCIDENCE

Welch years ago found that cancer of the uterus was one of the most common types of new growth. In a recent address before the 84th annual session of the American Medical Association, Hirst stated that cancer ranks second among the causes of death in America; that the mortality has increased from 63 to 96 per 100,000 or more than 50 per cent in the past seven years; that one of every eight women who reach the age of 35 years will have a cancer; and that of the cancers in women 25.8 per cent are in the genital organs. Of the genital cancers, 80 per cent occur in the cervix and it is generally agreed that cancer of the cervix is about eight to ten times as frequent as cancer of the body of the uterus. It should be emphasized at this point that *cancer arising in the cervix is quite distinct from that of the uterine body, both clinically and from the standpoint of diagnosis, prognosis and treatment.*

ETIOLOGY

The etiology of cancer in general is still unknown, but it is felt that certain predisposing factors, namely, trauma and inflammation, may play some part in the development of cervical cancer. Although lacerations and endocervicitis are the most frequent lesions found in the cervix and are considered by some as precancerous, Gardner states that there is no lesion of the cervix which is a definite precursor of carcinoma. Even though carcinoma does arise usually in a cervix which is lacerated and eroded, only a small percentage of patients with these lesions ultimately develop cervical cancer. Approximately 95 per cent of cervical cancers occur in women who have either been pregnant or who have had some operative manipulation of the cervix, although these factors seem to play no part in the development of carcinoma of the body of the uterus. For years cancer has been considered a disease of the middle and later decades of life, but numerous reports in the literature show that the age limits are quite variable. Glass has recently reported a case of carcinoma of the cervix in a girl of 16 years which was confirmed beyond doubt by clinical, microscopical and necropsy findings. This wide age variation should be emphasized, as no doubt some cases in the past have been improperly managed because cancer was not suspected early enough. It was previously thought that carcinoma of the cervix was less frequent in the colored race, but recent statistics show that the incidence is about equal in both races. Carcinoma of the uterus seems to be slightly more frequent in the white race and among the better classes. Strange as it may seem, carcinoma of the cervix is rarely seen in association with prolapse of the uterus, although ulcers are common in these cases of continual trauma and irritation.

*Read before the South Piedmont Medical Society, at Danville, Va., November 28, 1933.

PATHOLOGICAL HISTOLOGY

Cancers of the cervix may be divided into two types: (1) *Everting* or *cauliflower-like* growths, and (2) *Inverting* or *ulcerating* growths. The former usually arises from the vaginal portion of the cervix, while the inverting type usually springs from the region of the cervical canal, although there may be an overlapping by extension from the original site. Histologically, the cervical cancers are classified into: (1) *Squamous-cell carcinoma* or *epithelioma*, and (2) *Adenocarcinoma*, the former being much more common.

The classical picture of carcinoma of the vaginal portion is a papillomatous, cauliflower-like growth of pale pink, necrotic tissue which is very friable and bleeds easily on any manipulation. This lesion may vary from one of a centimeter in size to a large fungating, foul and necrotic mass filling the entire vaginal vault. The necrotic tissue frequently sloughs away, leaving a crater-like ulcer with a cartilaginous, indurated border. To be contrasted with this picture is the early stage in which there may be one or more small nodules in the cervix which are merely quite firm and indurated, with no ulceration or bleeding. This stage is usually diagnosed by the pathologist after a trachelorrhaphy or biopsy is done, but it is, after all, the stage par excellence in which the diagnosis of carcinoma of the cervix should be made in order that success in treatment be realized. Because of its incipient nature and rapid growth, it is essential that a thorough vaginal examination and biopsy be done in any case in which abnormal bleeding, persistent or increasing leucorrhea, or suspicious local evidence might indicate the presence of an early malignancy. It is wise to give all patients the benefit of both a manual and speculum examination rather than the continuation of expectant or conservative treatment without an adequate gynecological examination. We have seen patients thus treated over a long period of time for abnormal bleeding without an examination having been made, and in whom advanced carcinoma was found when first seen in the clinic. I feel sure that routine pelvic examination of all female patients, regardless of the primary symptom or complaint, would greatly enhance the battle against uterine cancer.

The usual picture of carcinoma of the body of the uterus is that of a more or less localized polypoid thickening of the endometrium, of a dead white or ivory color, which, on cut section, presents a rather sharp contrast to the surrounding uterine wall. The surface of these growths is usually irregular or nodular or presents a papillomatous, tree-like appearance. The tumor may take the form of an isolated polyp or multiple polyps, which may be either sessile or pedunculated. The distinct pale and necrotic tissue and the irregular surface of these carcinomatous polyps offer a contrast to the smooth surface and softer tissue of the benign uterine polyps, which show no invasion of the uterine wall. The uterus may enlarge to several times normal size in extensive adenocarcinomatous growths, but in the early stages show no enlargement or other palpable changes.

Microscopically, the appearance of cervical cancer depends upon the type of cancer present, but the usual neoplastic characteristics of lawless growth are prominent features. In the squamous-cell carcinoma or epithelioma, three different cell types are found: the spinal cell, the transitional cell, and the fat spindle cell, corresponding to the cells of the three layers of stratified squamous epithelium. Either of these cells might be the predominant type present in any given cancer. Variation in size and shape of the cells, intense staining of nuclei and mitotic figures are seen. Giant cells with multilobed nuclei and the so-called "pearly bodies" are common. Invasion and rupture of the basement membrane by the cancerous cells is seen and is a very important differential point. Martzloff, after intensive study of these growths, concludes that "the histo-morphology of the predominant type of cell in epidermoid cancer of the cervix is important in that it indicates the relative malignancy of a given tumor." In his study, the spinal cell type proved to be the least malignant, the transitional type next in order, and those in which the spindle cell predominated proved to be the most malignant. Adenocarcinoma of the cervix closely resembles the second group in the degree of malignancy. This comparison closely parallels the well-known grading of malignancy on the appearance of the tumor cells, as proposed by Broders, of the Mayo Clinic.

The microscopical appearance of adenocarcinoma, both of the cervix and of the body of the uterus, is that of a wild, rapidly growing, malignant gland tumor. The cervical or endometrial glands are ir-

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regular or tortuous, and there is seen growing into their lumens, proliferations or teat-like projections of the glandular mucosa. These papillary growths tend to maintain gland-like characteristics, but a piling up or reduplication of the cells of the new glands is characteristic. Invasion of the stroma or musculature by the epithelial cells is seen, indicating lawless growth. The cells in the new glands show variation in size and shape and staining properties, but tend to be somewhat blunter and stain more deeply than normal cells. Nuclear and mitotic figures are common.

EXTENSION AND INVASION

Cancer of the cervix is characterized by an early extension and invasion of contiguous pelvic structures. The cauliflower or everting type of cervical cancer readily spreads to the vagina, urinary bladder or rectum, whereas it tends to spread to the para-cervical tissues and regional lymph glands relatively late. The inverting or ulcerating type spreads laterally to the paracervical and parametrial tissues and lymph glands earlier, but it may later invade the bladder, vagina or rectum or spread upward to the body of the uterus. It is obvious that this type of cancer is particularly dangerous, as it may progress to an advanced stage before it is recognized. In contrast, the squamous cell carcinoma of the vaginal portion offers a better chance for early detection, due to the bleeding and discharge which accompany the extension of the growth and invasion of the blood vessels, and which often causes the patient to seek medical advice. As involvement of contiguous structures occurs, grave complications may arise from the invasion or compression of the ureters or pelvic blood vessels. Metastases to the thoracic and abdominal organs, particularly the lungs, liver and vertebrae, are not uncommon, as Behney has recently reported an incidence of 33 per cent in his series of 166 necropsies in advanced cervical carcinoma.

In contrast to cervical cancer, metastases from adenocarcinoma of the body of the uterus occur relatively late, the site of such metastases varying with the primary site of growth in the uterine body. Cancer of the fundal portion usually spreads to the lumbar lymph glands, while those in the lower portion of the uterus may metastasize to the iliac and inguinal glands. Involvement of the tubes and ovaries in these cases occurs more often than in cervical cancer. The primary cancer usually spreads by direct invasion of the muscular wall of the uterus and surrounding structures. Because of the early appearance of abnormal bleeding and relatively late metastases, adenocarcinoma of the body of the uterus offers a better chance for early detection and surgical eradication than does cancer of the cervix.

SYMPTOMATOLOGY

Cancer of the cervix is a treacherous disease in that the advent of symptoms which cause the patient to seek medical advice is ofttimes so late that the disease is in an advanced and often hopeless stage when first seen. Because of this incipient nature, it is important that the laity be taught the early symptoms and the importance of early medical attention.

The three cardinal symptoms of cancer of the cervix are *leucorrhea, bleeding* and *pain,* and they usually arise in that order. Leucorrhea is usually the first symptom noted, but because of the great number of women who have a leucorrheal discharge, the patient and the physician may overlook its significance. At first there may be only an increase in amount of the discharge, but it gradually assumes a watery, blood-tinged character, and in the end stages has a very foul and disagreeable odor as necrosis and putrefaction occur.

Abnormal bleeding is the most common and important symptom. The bleeding results from the erosion of capillary blood vessels by the cancer cells and at first may be only slight in amount, usually occurring between menstrual periods. It gradually increases as the disease advances, and the bleeding may become continuous. In the late stages, frank hemorrhage after excessive work, exercise, coitus, or digital examination, is a very important sign. Thus the cauliflower type of cancer arising in the vaginal portion tends to bleed more readily than the infiltrating type and therefore gives earlier warning of its presence. Carcinoma of the body of the uterus may first manifest itself merely as a slight bleeding or "spotting" between periods, as prolongation of the periods, or as bleeding after the menopause. When it occurs before the menopause, the clinical detection is more difficult as the bleeding is apt to appear only as a profuse menstrual flow. Particular attention should be paid to cases of bleeding after the menopause. In any such case, vaginal bleeding is a definite abnormality and should be re-

garded as due to malignancy until proven otherwise. Thus the importance of biopsy and curettage in any patient having abnormal bleeding, in whom the diagnosis is not definitely established, becomes apparent. In many of these cases, a diagnosis cannot otherwise be definitely assured until these procedures have been carried out. In a recent article, Williams classifies the causes of abnormal uterine bleeding under four groups: first, those associated with accidents or diseases of early pregnancy; second, a group of miscellaneous disorders, both pelvic and general; third, tumors of the uterus, and, fourth, functional hemorrhage. I refer you to his interesting article for a concise description of those conditions which produce abnormal uterine bleeding, and from which malignancy of the uterus must be distinguished.

Pain is a late symptom of uterine malignancy, and usually does not appear until the disease has progressed to an advanced stage, involving the pelvic nerves and other pelvic structures. At first mild, it may become continuous and of severe character. Invasion of the urinary bladder may result in dysuria, frequency, or burning pain, and rectal involvement may cause tenesmus and straining.

Of the physical findings, a striking feature in many cases is the excellent physical appearance of the patient, occasionally even in the advanced stages. Anemia, cachexia and fever are frequent findings of the late stages, resulting from absorption, blood loss, and infection. Symptoms of uremia or profound toxemia may be the terminal picture.

The findings on pelvic examination are variable. Abnormal induration in a cervix the seat of scarring and erosion may be the first physical indication of malignant change, as bleeding and gross change in the appearance of the tissue may be absent. Later, one may find a soft, friable tumor mass arising from the vaginal portion of the cervix which bleeds very easily on manipulation, or there may be found a bleeding, necrotic ulcer with an indurated border. In the advanced cases of widespread pelvic carcinosis, pelvic palpation reveals a thickening and fixation of all the pelvic structures, the so-called "frozen pelvis."

In cancer of the uterine body, the physical findings may be neglible, or may reveal only slight uterine enlargement. The uterus may show no enlargement and the adnexa present no change until late in the disease, and in most cases the diagnosis is made by microscopic examination of the endometrial tissue and not by the physical findings.

DIAGNOSIS

The diagnosis of uterine cancer depends upon a *careful history, findings on pelvic examination and inspection,* and particularly on the *microscopic examination of the tissue* removed. If the physician will supply the tissue, the gynecological pathologist will usually have no difficulty in diagnosing uterine cancer, and in many of the early cases, the diagnosis cannot otherwise be definitely established. A differential study to rule out the other causes of uterine bleeding, listed above, should be made in all cases. Biopsy of the cervix is a relatively simple procedure and it may establish the diagnosis at a time when treatment may be of value.

TREATMENT

Prophylaxis is of the utmost importance in the treatment of cervical cancer. Crossen states that we have in the past improved our results so that, instead of losing all of these patients, we are now able to save 20-25 per cent, but here the progress stops. He cites the fact that in a certain group of patients, namely, those in whom the diagnosis is made in the earliest stages, a cure can be obtained in 80-90 per cent, showing conclusively that the present mode of treatment is adequate to effect a cure in this disease, provided it is *recognized* and *treated early enough.* He concludes that our hope for a lower mortality rests largely with the individual physicians and depends upon diligent care, first, in *removal or treatment of chronic irritative lesions of the cervix* in all patients; second, *periodic follow-up examinations* upon patients thus treated; and *pelvic examination of all female patients regardless of their primary complaint.* The other important phase of prophylaxis, namely, the instruction of the public, also rests largely with the individual physicians in their advice to their patients. Norris feels that eradication of the chronic inflammatory lesions of the cervix would seem to be an efficient method in preventing cancer of the cervix. He states that the combined statistics of Pemberton, Graves, Smith and Bland show that among 18,562 patients adequately treated for these predisposing lesions, only fifteen subsequently developed cervical cancer, or, in other words, one in every 1,247 patients. Studied in another way, the same investigators found that among 2,250 cases of cer-

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vical cancer, only thirty-three or approximately 1.5 per cent had received adequate prophylactic treatment. These facts certainly seem pertinent in emphasizing prophylaxis in this disease.

Much has been written in recent years regarding the relative merits of radium, X-ray, and surgery in the treatment of carcinoma of the cervix. At the present time, it is the concensus of opinion that radiation therapy is the method of choice. According to Hirst, accumulating statistics show a superiority of results from a combination of radium and X-ray, and Williams states that in this country today cancer of the cervix is generally treated by deep pelvic X-ray therapy first, followed by direct radium application to the cancerous area. This plan of treatment is generally followed at the University of Virginia Hospital. The usual regime of treatment is the administration of a series of deep X-ray exposures to the pelvic region, followed in several days by the intracervical application of well screened radium. From 2,400 to 4,000 milligram-hours of radium therapy are given, depending upon the condition of the patient and the extent of the cancerous involvement in the pelvis. In many cases of advanced carcinoma in a patient of poor condition, an attempt at merely giving palliative doses of X-ray for the relief of bleeding or discharge is all that can be done safely. According to Ward, at the Howard A. Kelly Hospital in Baltimore, the above method of inserting radium in the canal is used when the growth is chiefly intracervical, with radon tubes placed over the cervix and the vagina well screened and packed. Fungating and ulcerative growths are treated with radon plaques alone, the dosage varying from 2,500 to 3,500 millicurie-hours. In massive growths filling the vagina, radon seeds are implanted directly into the tissue, and, if parametric involvement complicates the local condition or is recurrent after operation or irradiation, it is treated by implantation. Recently, Schumann, of Philadelphia, gave a preliminary report of a method of applying roentgen rays directly to the affected tissues in cases of advanced carcinoma by means of laparotomy and direct exposure of the pelvic tissues, after screening the abdominal walls with lead sheets. This procedure is carried out under avertin anesthesia in conjunction with intracervical or intrauterine application of radium, and in his three cases no untoward complications arose. The question of whether we are justified to impose the added danger incident to the anesthetic and opening of the abdomen in these patients who have advanced carcinoma is debatable.

Surgery in the treatment of carcinoma of the cervix now has fewer advocates, as almost all the prominent gynecological clinics have deliberately turned from surgery to radium; however, it must not be completely ignored, and should be considered in early cases which are suitable for hysterectomy. The radical hysterectomy is usually done if surgery is adopted, but Gardner states that "if carcinoma has already invaded regional structures a cure cannot be obtained by operative measures." Martzloff found that no patient in his series in whom broad ligament involvement was noted is living after operation; all died of recurrent carcinoma and 90 per cent lived less than one year. The field of surgery is limited in that only those cases which present no invasion of contiguous structures and in which the cervix is movable should be subjected to operation. Hirst concludes that "in the treatment of cervical cancer, the high mortality of the radical operation, the neglible mortality of radium application, the approximate equality of results, the shorter hospitalization, the absence of suffering, the palliation of symptoms, and the fact that radium alone can be considered in advanced cases, have relegated surgery to a subordinate place."

In the treatment of carcinoma of the body of the uterus, excellent results by surgical removal are usually obtained due to the fact that it gives symptoms earlier, grows slower, and invades and metastasizes later. The generally accepted method of treatment is radical surgery as soon as the diagnosis is made. Unfortunately, many of these patients are elderly and obese and are at best poor operative risks. When there is a contraindication to either operation or anesthesia, treatment by X-ray and radium must be substituted. Cures are obtained in from 65-80 per cent of the cases following radical hysterectomy, while results from X-ray and radium in cases too extensive for operation are not gratifying.

General supportive measures, care of the diet and elimination, and control of the anemia are essential. In the late stages, blood transfusions are often necessary to prolong life after severe or continual hemorrhage, and the liberal use of opiates is often necessary to allay the severe pain and continual suffering.

PROGNOSIS

The ultimate prognosis in any case of cancer of the cervix is uncertain, as it is difficult to decide what constitutes a clinical cure. Various criteria have been accepted as indicative of a cure over a period of five years, but in some cases recurrences of the cancer appear many years after eradication or treatment of the primary growth. Hirst states that, in 1927, Heyman collected 5,024 cases from twenty surgical clinics, and 2,512 cases from seventeen radiologic clinics, in which a five-year cure rate of 18 per cent and 16.3 per cent, respectively, was found. He adds that Bowing and Fricke, of the Mayo Clinic, in 1930 reported a 23.8 per cent cure rate in 1,000 cases, while Ward this year reported an absolute cure rate of 24.8 per cent.

The prognosis in carcinoma of the body of the uterus is more hopeful. The results of treatment in these cases are generally conceded to be much better, as in 60 to 85 per cent of these patients a clinical cure is obtained.

Thus it is seen that of four women who come to the physician with a cancer of the cervix, one may survive. In spite of skilful treatment, three of these four patients will die within five years. Improvement in results of treatment in this devastating disease depends upon, at least for the present, first, *early recognition* by biopsy and curettage in suspicious cases, and upon the institution of *prompt treatment* after the diagnosis is made. The question of early diagnosis frequently depends upon the cooperation of the family physician and the pathologist. The physician in general practice can often make a diagnosis at a time when treatment will be the means of saving the life of the patient, as so many of these patients are in a hopeless condition when they first seek relief from the clinics and hospitals.

SUMMARY AND CONCLUSIONS

1. A brief review of the characteristic features of carcinoma of the uterus is given.

2. Carcinoma of the cervix should be distinguished from carcinoma of the body of the uterus, as the two processes are quite distinct, both clinically and histologically, and in their response to the present methods of treatment.

3. The present concensus of opinion is that radiation therapy is the most efficacious in the treatment of carcinoma of the cervix, whereas surgical removal still stands as the procedure of choice for carcinoma of the uterine body.

4. The mortality rate from this disease is still high and better results from treatment can only be realized, at least for the present, by earlier detection and treatment.

5. The physician in general practice can do much to improve the present discouraging results by exerting every effort to make an early diagnosis and urge prompt treatment.

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Allied Arts Building.

PHASICITY OF FUNCTION.

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I have coined a word and hope I have not violated the maxims of the etymologist in the venture. It looks and sounds all right to me; and certainly the term fills a verbal hiatus. And the theme would fill, if properly expounded, I believe, a clinical hiatus. For, if my observation has not been widely at fault, it cannot be unjust to say that too much of our clinical thinking and acting has been in terms

of the stationary rather than in terms of the incessant rhythmic change—the physiological ebb and flow, the wave-motion of function—which is organic existence. It is as if we had stopped the moving picture at two or three points on the reel, centered our attention on these few static pictures and forgotten everything that goes before or after or in between. To illustrate: Take the matter of arterial tension—who will doubt that the average physician's mental gallery contains at most three pictures on this subject, one labelled "high blood pressure," one "low blood pressure" and one "normal blood pressure." How many have taken the trouble to examine the reel before and after and in between these three "shots," to see the beginning, the middle and the end of the story, and learn how normal blood-pressure becomes low and high and back again to normal? How many of us stop to wonder, much less to ascertain, as we read our sphygmomanometer, what part of the physiological wave, what phase of function, our patient is traversing, and in so failing, fail to grip the one essential—whither is our patient headed? If his tension is abnormally high or low, it is true we have discovered that he is headed off the road of normality—but in what direction? It is well enough to know that he is "on his way," but it is crucial to also know "where he's going." We say a person has low blood-pressure—we'll give him something to raise it. The real problem—although the patient will probably never realize it—is not quite so easy. A low pressure may be the first phase in cardio-vascular fatigue, in which the next phase is a rising pressure. And if we apply measures to raise the tension of this patient (other than the physiological one of rest) we are merely aiding and abetting the forces of disease instead of combating them.

Another illustration: the leucocyte count. Everyone will agree, I think, if he stops a moment to consider, that it is much more important to know whether the leucocytes are increasing or decreasing in number than to know that they are a certain amount below or above a certain average figure that we call "normal." In other words, we want to know in what phase of the leucocytic tide our patient is—in what direction the process is moving—not that he's "on his way," but "where he's going." All this, of course, involves not only knowing whether a count is rising or falling, but knowing the significance of the change. A falling count *per se* may mean that the patient is convalescing from an infection, or is succumbing to that infection: a rising count *per se* may have the same two extremes of significance.

A third illustration: The antibody titer. If a person is subject to boils or arthritis or what not, are we not too prone to jump to the conclusion that his antibodies need stimulating—by vaccines or serums or non-specific antigens? Do we often stop to consider that it may be his antibodies are *exhausted*—over-stimulated, in fact, rather than under-stimulated? And what he may need is restoration of antibody rather than the stimulation of antibody. Stimulation without the supplying of antibody material (state) would in this case aggravate the condition rather than ameliorate it.

And so the illustrations might be multiplied indefinitely. An especially interesting one to me is that of the blood-platelet tide. But of that, more anon perhaps. Let me conclude by repeating for my own edification and I would hope for that of some readers: Bodily functions are phasic, fluid, ever-changing reactions. We must estimate them in non-static terms if we would attain accurate clinical insight.

THE LATEST DEVELOPMENT IN THE TREATMENT OF FRACTURED SPINES.*

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Of twenty European Orthopaedic clinics recently visited, Dr. Lorenz Bohler's traumatic clinic in Vienna remains the most impressive. The systematic and precise way in which he treats fractures and the quality of his end results revealed to me a new era in traumatic surgery. Dr. Bohler treats fractures by accurate reduction, immobilization only

*Case demonstrated before the Section on Bone and Joints, Southern Medical Association, Richmond, Virginia, November 18, 1933.

Read before the Richmond Academy of Medicine, Richmond, Virginia, January 17, 1934.

of the area involved, and immediate physiological function—thus, old methods of treating fractures where "immobilization of the joint above and below the injured area with prolonged rest" was the keynote to all treatment, have been replaced.

What the term "a broken back" meant to the injured, and the outline of treatment for such by the doctor, have changed from what used to be slight or no reduction of the compressed vertebrae, immobilization in plaster jacket or shell for three to four months, and a convalescence over a period of twelve to eighteen months, to that regime which I shall outline for you and under which this patient was treated. From the impression years ago that "a broken back" necessitated not only prolonged hospitalization, permanent deformity, and probably partial permanent disability, we arrive now at perhaps a more scientific approach to the handling of these cases. Up until the past five years the interpretation of this expression, not only to the layman but to the doctor, meant the patient's incapacity for work and a permanent deformity.

Most of these erroneous beliefs about "broken backs" have passed with the progress of medical science and there is now a new era in the treatment of this condition.

The first step, treating the patient's mental attitude by assuring the patient, although he has a broken back, if he will cooperate, he will be as good as he ever was, and in many respects stronger and more able to work than before, is the most vital part of our present treatment. To further assure the patient that although his spine is fractured, he will not have a permanent deformity, that he will not be an invalid and that he will go back to work a well man, gives encouragement for the cooperation which is so necessary in the performance of the daily treatment which the pictures illustrate.

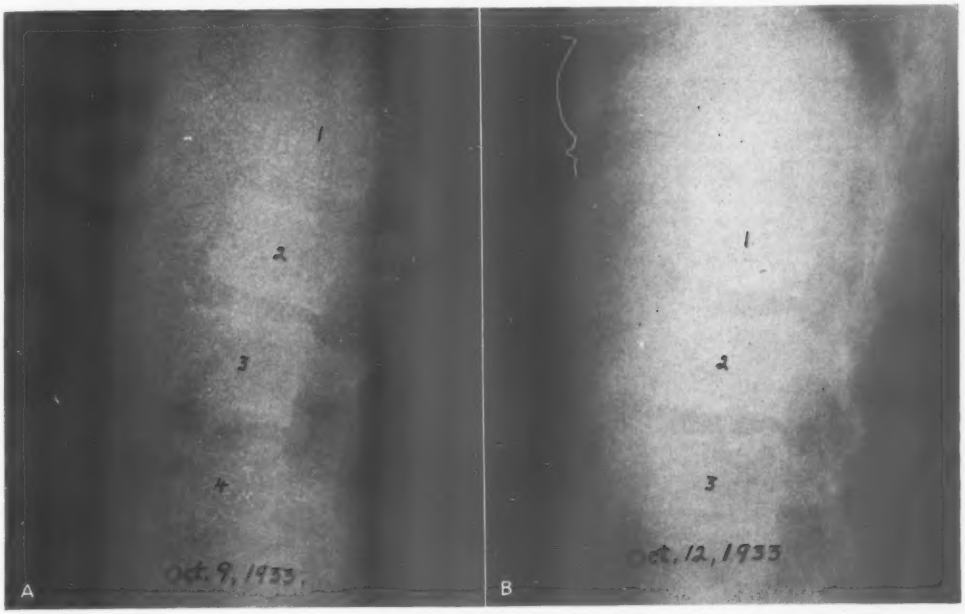

Fig. 1.—A. Roentgen ray examination of the spine taken October 9, 1933, before reduction. Note the compression of the first lumbar vertebra and the anterior dislocation of the twelfth dorsal on the first lumbar.

Fig. 1.—B. Roentgen ray examination of the twelfth dorsal and first lumbar vertebrae following reduction after hyperextension.

The actual reduction of the compressed fractured vertebrae is accomplished by hyperextension of the spinal column. Local or general anesthetic may be used.

It was Dr. A. W. Rogers, of Massachusetts General Hospital, who proved that hyperextension of the spinal column could be carried just so far, because, through experimentation, he found that the anterior longitudinal ligament that runs along the anterior surface of the bodies of the vertebrae and is at-

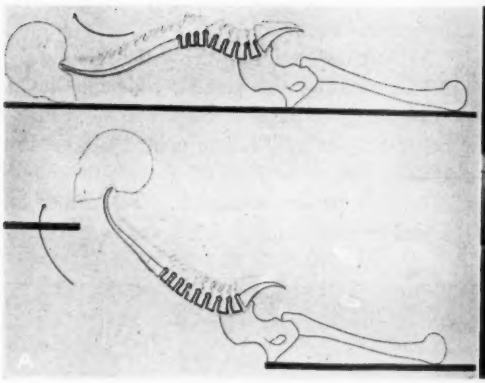

Fig. 2.—A. Schematic drawing showing the compressed vertebrae before and after hyperextension of the spine and the anterior spinous ligament serving as a check-rein to limit the degree of hyperextension possible.

Fig. 2.—B. Method of hyperextension showing the position of the patient while the spine is being reduced and the plaster jacket applied.

Fig. 3.—A. A feat this patient could do only once or twice at a time in the beginning was gradually increased until it was done with ease twenty times daily.

Fig. 3.—B. Exercising the rhomboid, trapezius, latissimus dorsi. All the deep muscles of the back come into play when this exercise is performed.

Fig. 4.—A. Exercises started on the fifteenth day. Extension of back on thighs, exercising the erector spinae muscles.

Fig. 4.—B. From once daily this exercise was repeated and gradually increased until it could be easily repeated twenty-five times daily.

Fig. 5.—A. Weights starting with fifteen pounds were carried and gradually increased up to sixty pounds in each bundle, as is shown in this picture. Note the cast, how it fits well up over the sternum and down over the hips.

Fig. 5.—B. Weights starting with fifteen pounds and gradually increased up to seventy-five pounds were carried on the head. This not only exercises all the muscles of the back but puts weights on the spine—a desirable factor in treating such cases.

tached at the upper and lower lip of each vertebra, has a tensile strength equal to that of the tendo-achilles, and that when the spinal column is hyperextended, this anterior spinus ligament serves as a checkrein to the degree of hyperextension possible. With pull on each lip of the bodies of the vertebrae, restoration of the height of the vertebrae is obtained. A non-padded plaster jacket is applied while the patient is hyperextended, fitting well up on the sternum and down over the pubic bone. The

secret of the subsequent treatment depends on proficient immobilization by means of this jacket.

Dr. A. G. Davis, of Erie, Pennsylvania, was the physician who reviewed this method and advocated that the time of recumbency could be reduced to two months. Dr. Bohler observing these procedures at the Massachusetts General Hospital and at the American Orthopaedic Association when it met in Boston in 1930, took home with him to Vienna the principles of reduction. There he added the finishing touch of immediate active motion following reduction of the fracture or fracture dislocation, whichever the case may be.

This article describes the end result of a fracture dislocation of the lumbar vertebrae with paralysis in a patient whom I had the opportunity of treating immediately after my return from Europe, just six months ago.

Mr. C. H., age 27 years, while walking in his sleep on the night of October 8, 1933, fell from his bedroom window to the driveway below, sustaining an injury to his spine. Physical examination revealed a deformity in the lower dorsal and upper lumbar spine and partial paralysis of both legs. X-ray examination showed a compressed fracture of the body of the twelfth dorsal with a forward dislocation of the twelfth dorsal on the first lumbar vertebra.

Fig. 7.—Roentgen ray examination of the spine three months after treatment and after the plaster jacket had been removed. Note the preservation of the height of the vertebrae and the intervertebral space.

Fig. 6.—Flexion of the extended thighs on the abdomen was another exercise started once daily and increased until the patient would carry out this procedure thirty times. The psoas major and minor, along wth the rectus abdominis muscles, are the chief ones concerned here. So great was the development of the abdominal muscles, one could stand on the contracted abdominal wall.

On October 10th the patient was given gas oxygen anesthesia and by the method described above, the spine was hyperextended. While the patient was in this position, a non-padded plaster jacket was applied, fitting well up over the sternum and moulded close about the hips.

When there is no abnormal nerve manifestation, the patient is got up on his feet on the second to fourth day and made to exercise immediately. In this particular case there was paralysis of the entire right leg from knee down and some weakness of the right gluteal group; on the left side the dorsal group of muscles in the foot and leg showed nerve paralysis. For this reason, this patient under treatment was kept recumbent from October 15th, the date of reduction, until November 1st, when he was allowed to get up. During this in-

terval. rapid recovery of nerve involved muscles was seen.

Exercise by squatting, pulling up on rings, flexion of extended legs on abdomen and extension of back on thighs was started. Weights of fifteen pounds were carried on the head and increased gradually until sixty pounds were carried. With this daily routine the patient progressed to the extent that he was much stronger than he was before the accident.

The key to the success of the new treatment of all fractures is active motion of all muscles about the injured part. Active motion is started immediately instead of putting the part at rest, allowing the muscles to dwindle away, muscle tone to diminish, stagnation of circulation to occur. This serves two important physiological functions.

We know that muscles serve as the heart to the venous system; therefore, active motion maintains muscle tone, which, when lost, is as debilitating as the fracture itself, but when maintained, through activity, supplies the fractured area with more normal blood supply, a quicker healing of the injured part, and a reduction to a minimum of the post healing disability.

This patient, whose case this article describes, returned to work February 1st, stronger than he was before his accident. He has since this time worked as a traveling salesman, driving many miles daily without pain or discomfort. He was given a thorough physical examination on March 26th, at which time his back was without limitation of motion in any direction. The spinous process of the twelfth dorsal vertebra could be palpated slightly more prominently than the adjacent ones, a condition that was present when the cast was first removed and accounted for by the slight narrowing of the joint space between the bodies of the twelfth dorsal and first lumbar vertebrae.

Five cases of compressed fractures of the bodies of the vertebrae have been treated under my observation within the past six months. All of these cases have completely recovered under the regime outlined above and are back at their various occupations without a mechanical support and without physical deformity, limitation of motion, pain or discomfort.

It is no longer necessary that the term "broken back" should carry with it negative connotations so

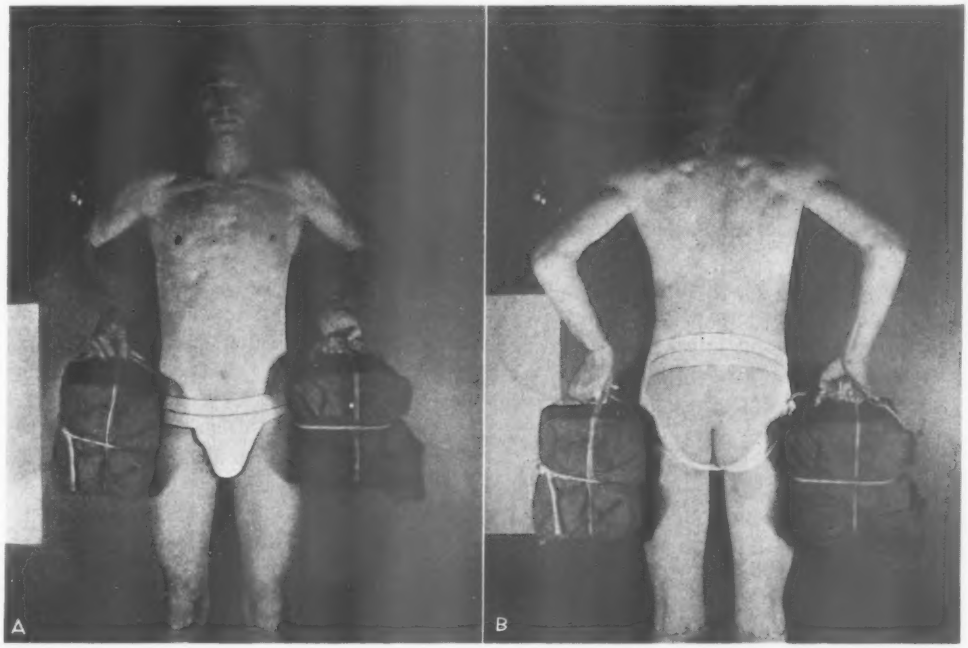

Fig. 8—A. With sixty pounds in each hand this shows the patient's muscular development after three months of exercises.

Fig. 8.—B. Muscular development of the back muscles to the extent that when the plaster jacket is removed no form of support is necessary to hold the spine erect.

prevalent in the end results of such cases treated five or ten years ago. Reduction by hyperextension of the spine, depending on the anterior longitudinal ligament to serve as a checkrein for the degree of hyperextension possible, originated with Rogers and Davis and is generally known today.

Active motion of the muscles about the fractured area, not only in cases of fractured vertebrae, but in all types of fractures, hastens healing by a more normal physiological supply of blood to the part, increases muscle tone and thereby eliminates any mechanical support following healing of the fracture.

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THE NON-OPERATIVE TREATMENT OF HEMORRHOIDS.*

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In selecting a title for my paper, I am not unmindful of the fact that any mechanical procedure for relief of hemorrhoids *is* in reality an operative procedure, yet this is an ambulatory treatment that appeals to the great mass of people who abhor the "knife" and operating rooms. Perhaps "The Injection Treatment of Hemorrhoids" would have been a more suitable caption. I shall attempt to give you as comprehensive an outline of the subject as time allows on this program.

This form of treatment is becoming increasingly more popular, and justly so, due to its greater margin of safety, no loss of time from work, no hospitalization, no anesthetic, and less financial outlay. In some localities one hears strong opposition to the injection treatment, but in practically all cases it is not the treatment that is at fault, but it is due to the fact that inexperienced men have attempted to inject all types of hemorrhoids. They have treated thrombosed, ulcerated, and infected piles, and have not used the proper sclerosing solutions. Strictest attention to every detail and utmost care must be exercised if one is to avoid disaster. Let me here emphasize the fact that there is but one type of hemorrhoid that is suitable for non-surgical treatment, and that is the internal hemorrhoid, uncomplicated by cryptitis, infection, thrombosis, ulceration, fissure, fistula, or external hemorrhoids. If these complications exist, surgical operation is the treatment of choice.

In a discussion of this subject it is well to review briefly the anatomy and physiology of the lower rectum and anus. I must apologize for the time consumed in this review, as all of us are well versed in the anatomical location and landmarks of the

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distal orifice of the gastrointestinal canal, yet there are peculiar anatomical and physiological characteristics which one should understand thoroughly in order to diagnose and treat hemorrhoids satisfactorily.

The pectinate line, or linea dentata is a well defined circumferential ring around the anal canal which marks the point of fusion of the skin from without and the mucous membrane from within the rectum. This serrated line is an important and strategic landmark as it also marks the line of division of the nerve, blood, and lymphatic supply of this region. The part above the pectinate line is supplied by the sympathetic nervous system. This means that the rectal mucosa is without sensory fibers and explains why a malignant growth may progress to an inoperable stage before it is recognized by the patient. Until a carcinoma of the rectum has extended to extra-rectal structures to produce pelvic pain, discomfort in the hips and back, or abdominal pain as a result of obstruction and tenesmus, pain is not manifest. The nerves which supply the cutaneous margin of the anus are derived from the cerebro-spinal system *via* the lower sacral plexus, and have to do with sensory and voluntary motor function. These fibers transmit the painful impulses from sensitive external hemorrhoids.

The vascular structures are also vastly different above and below the pectinate line. We are concerned chiefly with the veins in this discussion. Those above the pectinate line ultimately empty into the portal circulation, while those below the linea dentata empty their contents into the vena cava *via* the middle and inferior hemorrhoidal veins and iliacs. Some anatomists claim that there is no free anastomosis normally between the veins above and below the pectinate line, but undoubtedly there is some connection after hemorrhoids develop.

Above the dentate line the lymphatic channels pass upward beneath the rectal mucosa and empty into the sacral and hypogastric nodes. Below it, the lymphatics drain downward and forward into the inguinal nodes. Thus is explained the direction in which metastasis may be expected in malignant disease, and also the course taken when lymphangitis develops in infected external hemorrhoids.

Etiologic Factors: Reference to some of the older works in surgery reveals practically the same list of factors influencing the production of hemorrhoids as we find in the latest textbooks. Man is said to be the only creature so afflicted. This is thought to be due partially to the erect posture, which produces stasis in the hemorrhoidal veins. These veins are without valves to relieve the back pressure. Excess in eating, constipation, diarrhea, drastic purgatives (phenolphthalein is thought by some to produce a proctitis which favors the formation of hemorrhoids), intra-abdominal tumors, pregnancy, and parturition are well known etiologic factors. Straining at stool and trauma from hard fecal material, foreign bodies, sedentary habits, and constant riding in automobiles are also frequently thought to cause hemorrhoids. One of the most potent factors in the etiology of hemorrhoids is infection. The tiny anal crypts and fissures may easily admit infection into the peri-anal spaces, followed by a low grade painless cellulitis and phlebitis of the hemorrhoidal veins. This results in a weakening of the venous walls, dilatation and incapacity. The muscular walls are replaced by fibrous tissue and a sacculated varicosity, ofttimes containing clots, results.

Diagnosis: It is to be deplored that many physicians are backward about making rectal examinations. Still fewer are not in the habit of making a proctoscopic or sigmoidoscopic examination. Most lesions in or near the rectum are perfectly manifest upon direct examination and most of them are amenable to early treatment properly applied. Most errors here, as elsewhere, are due to failure to examine the patient rather than to ignorance on the part of the examiner, or to the bizarre and complex nature of the ailment. In no other phase of medical practice are there more slovenly and slipshod methods of diagnosis. Too many in our profession are perfectly content to let the patient come in with his or her own self-made diagnosis. The practice of routinely prescribing some proprietary ointment or suppository is pernicious. This frequently palliates the patient or allows an operable condition to progress into an inoperable one. Quite recently I was privileged to examine a lady, who for months had complained of "piles," and for whom some one had prescribed an ointment without so much as even examining her. The first thing I noticed when doing a rectal examination was an annular, indurated growth almost completely encircling the lower rectum and greatly decreasing the lumen of the

bowel. Another patient seen recently had been treated for "prolapsed hemorrhoids" for weeks with various ointments, when he really had latent syphilis with condylomata. These cleared up rapidly following anti-luetic treatment. I mention these two cases merely to emphasize the importance of careful examination and to stress the necessity of being alert to recognize the dangerous non-hemorrhoidal conditions which may masquerade as hemorrhoids.

For all practical conditions, hemorrhoids may be grouped into two classes—internal and external, or a combination of both. The internal type varies from a capillary or nevoid form, which bleed easily, to the larger pedunculated ones which are prone to protrude following defecation. These patients usually give a history of prolonged discomfort, frequently with bleeding at stool and prolapse. Internal hemorrhoids are always covered with mucous membrane in contradistinction to the external ones which are covered with stratified squamous epithelium. The sufferer from external hemorrhoids usually complains of sudden extreme discomfort in the region of the anus following some severe physical straining at hard labor or at stool. It sometimes follows profuse diarrhea. This type of hemorrhoid has a swollen, glistening, bluish color in the acute stage. If unoperated upon, they usually become shriveled up to produce the commonly known "skin tabs" seen about the anus.

Many patients and some physicians describe what they term "itching piles" as though it were a distinct clinical entity. I have never been satisfied that this condition is not due to a peri-anal dermatitis, probably epidermophytosis. Some type of mercurial medication applied locally is very gratifying in these cases.

Treatment: In the so-called conservative treatment of hemorrhoids, obliteration of the offending varicosities is the object striven for. The most popular method at present is by injection of 5 per cent quinine and urea hydrochloride. Some men prefer either the galvanic current or electro-coagulation by means of the high frequency current. This latter method is crude, causes a slough, and appears to me to be very un-surgical. The "chemical current" from a good galvanic generator is the better method. Here a biterminal contact is used, employing the negative electrode in the form of a needle inserted into the submucous tissue of the hemorrhoid. The current used is about eight to fifteen milliamperes for seven to ten minutes with each application. It requires several treatments to each hemorrhoid and is time consuming, requiring about three-quarters of an hour at each seance. The sclerosing action here depends upon a chemical irritation and fibrosis resulting from the liberation of nascent hydrogen gas and sodium hydroxide from the tissue juices.

I have employed both of the electrical methods referred to, but my personal experience makes me prefer the injection method as the superior one, which, if properly carried out, offers the best solution to the internal hemorrhoid problem. The technique requires a reasonable amount of skill and good judgment, both as to selection of cases and the proper amount of sclerosing solution used. If too much is injected you will get a pressure necrosis with sloughing. I understand that one of our fellow townsmen, after visiting a near-by shrine for anal afflictions, received such a complete slough of the peri-anal tissues that he had to spend several weeks in a well-known hospital in a distant city.

Some proctologists prefer a solution of phenol either in glycerine or vegetable oil. The literature contains reports of many cases of rectal stricture as a result of the injection of this solution. There is always a possibility of getting it into a vein, and from this standpoint it does not appear as desirable as less toxic solutions such as the quinine and urea hydrochloride which was introduced by Dr. E. H. Terrell, of Richmond, Va., in 1913. This solution should not be used where the patient has an idiosyncrasy to quinine. The *modus operandi* of the quinine and urea hydrochloride in destroying hemorrhoids has been carefully worked out. There is set up immediately a chemical phlebitis within and around the dilated vein. After a short time there is perivascular lymphocytic infiltration and formation of a thrombus within the lumen of the vein. At the end of twenty-four hours there is marked infiltration about the vein, simulating a beginning abscess. Before this stage the patient notices a feeling of fulness for a short time within the rectum, as though he wanted to defecate. This should be explained to him at the time of the treatment. Gradually there is a recession of the tumor-like mass and organization takes place, so that after several weeks nothing remains but a thickened ridge in the rectum to mark the site of the former hemorrhoid. This scar tissue is later absorbed and the mucosa regains its normal appearance.

Where the patient has multiple hemorrhoids to be injected, it is best to keep a written record with date and location of the ones treated. If the same hemorrhoid is re-injected after a few days, it may produce sloughing. I feel that best results are attained where the cases are treated leisurely at five to seven day intervals. In the beginning it is very essential to explain the entire procedure to the patient and get his full cooperation. He should be told that the treatment is almost one hundred per cent effective when properly carried out, provided he will cooperate and continue until he is discharged.

The adverse reports in the literature and criticisms of the injection method are due to several factors, namely: inefficient treatment, improper selection of cases and solutions, and insufficient treatment due to the failure of the patient to remain under the physician's care until he is cured. The majority of patients whom I have treated for hemorrhoids have received symptomatic relief almost without exception following the first or second treatment. Their bleeding and protrusion have been relieved and they stop treatment before adequate treatment was received. These cases will undoubtedly have further trouble, and some will say that the treatment was a failure. Had they continued treatment, they would probably have secured permanent relief.

CONCLUSIONS

1. Hemorrhoids still head the list of anal afflictions and cause untold and unnecessary pain and suffering.
2. Approximately 50 per cent of all hemorrhoids are amenable to office treatment.
3. Procrastination on the part of patient and doctor in delaying examination frequently permits malignancies and other progressive pathological conditions masquerading as hemorrhoids to go unrecognized until possibility of cure is remote.
4. The main criticism against injection treatment of hemorrhoids should be directed toward the inexperienced operator and not to the type of treatment.
5. External hemorrhoids should be treated surgically, while internal hemorrhoids, due to their lack of sensory nerves, can be injected painlessly, safely, and efficiently.

DIVISION OF PLEURAL ADHESIONS IN THE PNEUMOTHORAX TREATMENT OF PULMONARY TUBERCULOSIS.*

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The ultimate favorable outcome in pneumothorax cases depends upon adequate collapse of the lung. This collapse is necessary to provide sufficient functional rest in order to render the lung no longer a source of toxemia, and to free the sputum of tubercle bacilli.

Adhesions between the lung and chest wall cause more failures in pneumothorax therapy than any other complication. When adhesions between the visceral and parietal pleurae prevent collapse of the tuberculous areas, it may be necessary to sever the phrenic nerve to permit relaxation of the diaphragm and give pressure from below. If this is inadequate a complete thoracoplasty may have to be done with its resultant permanent collapse.

An attempt to avoid this radical, but often necessary operation, has induced some phthisiologists to increase the intrapleural pressure to dangerously high levels. This is done in the hope that the adhesions can be stretched and the collapse improved. The employment of high pressure is hazardous, for it may cause the rupture of an adhesion with consequent tearing of a cavity wall or of lung parenchyma resulting in spontaneous pneumothorax, or an empyema, or both. Sauerbruch[1] reports that out of seventy-three cases of cavity rupture, fifty-seven were due to such attempts to stretch adhesions. Of these fifty-seven cases forty-three died during the first week and six later, a mortality of 86 per cent. This method has been largely discarded.

A pneumothorax that is compromised by adhesions is often allowed to be continued indefinitely, either

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in the vain hope that the patient might improve, or because no alternative other than a radical operation can be offered the patient. Such a prolonged ineffective collapse may give to the patient and physician in charge a false sense of security. Actually the disease may extend to the opposite lung, larynx or gastro-intestinal tract. When this extension is recognized, the patient may then be too far advanced to take advantage of other forms of collapse.

In reviewing 850 cases of pneumothorax, Matson[2] found that of those having a good collapse with no adhesions, 48 per cent were clinically well, 20 per cent were arrested, and 21 per cent were dead. When the collapse was partial, being interfered with by adhesions, only 13 per cent were clinically well, 13 per cent were arrested and 50 per cent were dead.

In an attempt to improve the efficacy of artificial pneumothorax in the presence of adhesions, without resorting to the more radical or dangerous procedures already mentioned, the method of division of adhesions under direct vision and in the closed chest was devised. The present paper is a discussion of this alternative procedure, the so-called closed internal pneumolysis. In principle it consists of visualization of the adhesions through the thoracoscope, an instrument carrying lenses and a light which is introduced into the chest cavity through a small intercostal puncture. The adhesions may then be divided by the application of the cautery or high-frequency current.

Matson,[3] observing a large series of cases suitable for pneumothorax, found that only 40 per cent gave a satisfactory pneumothorax without adhesions; 40 per cent gave a partial pneumothorax with adhesions and the remaining 20 per cent had no free pleural space. He then reviewed ninety-one cases that had died and found that 40 per cent would have been suitable for the division of adhesions. He felt that perhaps half of those dead could have been saved by cutting the adhesions.

PATHOLOGY. The tuberculous process in the lung when close to the periphery produces an inflammatory reaction in the visceral pleura. This is expressed by a fibrinous exudate causing adhesion between the visceral and parietal layers of the pleura. In time the exudate becomes organized and fibrous and appears as a typical adhesion. Therefore, the adhesions are usually directly over cavities or over heavily infiltrated areas of lung tissue; exactly the areas that are most in need of collapse. Adhesions are most frequently attached to the upper lobe, where tuberculous lesions are most abundant.

Adhesions usually exist before the institution of pneumothorax but may form after treatment has begun under a pleural effusion in the lower chest. They then pull the lung out along the diaphragm and fix it to the chest wall, frequently causing severe cardiac displacement. The adhesions may then slowly form from below upward and gradually obliterate a satisfactory pneumothorax.

The pleura covering the adhesions is derived from both visceral and parietal pleurae. The blood supply enters as collaterals from the intercostal vessels. Sensory nerve fibers supply the parietal pleura.

TYPES OF ADHESIONS. Most adhesions fall into one of the following classifications:

1. String-like and thin band adhesions with neither end broadened. Because of the small pleural areas involved, it is supposed that these form shortly before the institution of pneumothorax. They are quite elastic and are easily cut, but play little part in preventing collapse of the lung.

2. Bands or cords with broadening at the thoracic end. These are older adhesions that have become fibrotic. Their shape is due to the pulling out of the parietal pleura in a tent-like fashion. The therapeutic effect is good after section of this type. Strings and bands of these two types comprise about 60 per cent of adhesions.

3. Bands or cords with conical pulmonary insertion. These are of long standing and dense. As a consequence of disease the lung has little elasticity and is drawn out into the adhesion. It may be prolonged an incredible distance. A cavity may be pulled out into an adhesion even of pencil thickness. Most empyema complicating this operation results from injury to the lung in this type of adhesion but the therapeutic effect of dividing such adhesions is excellent.

4. Bands and cords of hour glass shape (both ends broadened). Many important adhesions belong in this class. The danger in cutting these is somewhat less than those of type three, in that the possibility of accident is evident, and greater caution is used in their division than those in type three. Nearly 75 per cent of the attackable adhesions contain lung tissue.

Prolonged pneumothorax alters the form and

structure of adhesions. Weaker ones rupture, many larger ones stretch and the relatively loose connective tissue becomes organized and dense.

DIAGNOSIS. The diagnosis and localization of adhesions depends upon the X-ray. They may be seen under the fluoroscope, but for accurate information regarding the number, size, shape, direction and points of attachment of the adhesions, good stereoscopic plates are an absolute essential. Even with this aid, it is almost axiomatic that the impression given by the X-ray is always different from the actual appearance of the adhesions when seen in the chest. For example, adhesions that appear to be string-like in the X-ray are often seen to be broad bands with thickening at each free border, when viewed through the thoracoscope. Adhesions are often found in the chest that do not appear on the X-ray plate. It is therefore not possible to predict with certainty the suitability of adhesions for cutting until thoracoscopy is done. In some instances, cases that seem unsuitable for division of adhesions when the X-rays are studied, are found suitable and a satisfactory collapse may be obtained when the adhesions are examined under direct vision.

In some clinics all pneumothorax cases are examined by means of the thoracoscope. This is probably unnecessary but shows the safety of the precedures.

Walls of large cavities sometimes appear in the X-rays as adhesions. Careful comparison with old films made before the institution of pneumothorax is necessary to avoid this error. If there is still uncertainty as to the accurate diagnosis of the adhesions, lipiodol may be put into the pleural space and the patient viewed from different angles under the fluoroscope.

The operator must have a clear idea of the location and direction of the adhesions in order to insert the instrument at a point which will give the best possible approach to the greatest number of adhesions. The intercostal spaces in the anterior chest are wider than posteriorly. The muscles in the interscapular regions are thick and interfere with easy manipulation of the instrument. In general, therefore, if the position of the adhesions permit, the anterior or axillary approach is preferred.

Fig. 1.—A. Large multilocular cavity in left upper lobe held open by several large adhesions. Patient running fever, sputum heavily positive.

Fig. 1.—B. After cutting adhesions. Intrapleural pressure exactly the same as in A, but cavity is closed, cough and sputum entirely gone, temperature normal.

INDICATIONS. Treatment with pneumothorax for several months may be necessary to determine the degree of collapse obtainable in any particular case. The further maintenance of an unsatisfactory collapse is usually not justifiable because of the danger of extension of the disease, and for economic

reasons. The division of adhesions to convert the partial collapse into a satisfactory one must then be considered.

The clinical indications which make the consideration of pneumolysis urgent, in addition to the failure of the pneumothorax patient to improve satisfactorily are the following:

1. When the relatively high pressure necessary to produce even partial collapse and to keep the patient even partially afebrile causes shifting of the mediastinum and embarrassment of the opposite lung.
2. When with a fixed mediastinum the pressure results in severe dyspnoea and irritating cough.
3. When the pressure causes formation of considerable fluid.
4. When the tension on adhesions causes pleural pain.
5. When the pressure forces down the diaphragm giving rise to gastrointestinal symptoms (occurs especially on left side). Most of these symptoms are due, of course, to the physician's desire to produce a satisfactory collapse, even in the presence of adhesions, resulting in his use of relatively high intrapleural pressure.

Adhesions which are holding cavities open or preventing the collapse of heavily infiltrated portions of the lung should always be considered for division. It must be recognized that adhesions not only prevent the proper collapse of the involved lung, but as the adhesions become older and the scar tissue contracts, they may drag the lung outward to the chest wall. This contracture of the adhesion may progress in spite of all the efforts of the physician to prevent it. It can only be avoided by division of the adhesions. Various observers estimate that almost half (Matson—45 per cent) of all unsatisfactory pneumothorax cases are suitable for division of adhesions.

CONTRA-INDICATIONS. Division of adhesions should not be done during an acute formation of exudate or acute pyothorax. A chronic tuberculous afebrile pyothorax is not a contra-indication *per se*, but if the adhesions are covered with fibrin and purulent debris, it may be difficult or impossible to see enough of the adhesions to make the operation safe.

Tubercles on adhesions do not positively contra-indicate division, but they must be avoided. Consideration of the possible presence of microscopic tubercles is necessary before cutting in the presence of many visible tubercles.

Extremely dense and short adhesions holding the lung tightly against the chest wall are unsuited for cauterization. The great majority of adhesions that are suitable for division are in the postero-lateral portion of the pleural cavity with peripheral attachment somewhere between the second and fourth ribs. Apical adhesions are often thick, short and difficult to reach, besides being in close proximity to the brachial plexus and subclavian vessels.

TECHNIQUE. In 1913 Jacobeus described his instrument. It consists of two cannulae, one carrying lens and light, the other a cautery tip. The wire is heated by electric current, thus becoming a galvano-cautery. This was much improved by Unverricht in 1922 and is now known as the Jacobeus-Unverricht instrument. This instrument requires two sites of insertion, and considerable skill is necessary to manipulate the two parts simultaneously. The hot wire has the disadvantage that heat to cherry red may burn too fast and cause serious hemorrhage. Smoke from the burning tissue is very annoying. If a relatively cool tip is used the danger is less but it makes the operation very slow and tedious for both patient and operator. The radiating heat from the cautery is an important factor in post-operative pain and formation of exudate.

In 1929, Davidson[4] described an instrument modeled somewhat like the old Nitze cystoscope—carryng cautery and lens through the same cannula. The electrode is guided in much the same manner that the urethral catheter is guided in the cystoscope. This instrument makes use of the radio-frequency current which cuts by cellular disintegration. By means of electro-coagulation operations can now be done that could not have been attempted by galvano-cautery. There is less pain, the operation can be done more quickly and there are fewer post-operative complications. No heat is involved. Davidson's instrument was used in the series of cases herein reported.

In the pre-operative preparation if any considerable amount of fluid is present, this should be aspirated. The patient should have a refill of gas within twenty-four hours before operation. The maximum permissible tension should be used in order to have a large space in which to work, and to stretch the adhesions to their greatest length and

thinness. Preliminary doses of sodium amytal and morphine are given.

A point on the chest wall previously determined by a study of the stereoscopic films is infiltrated with procaine. An incision about 1 cm. long is made in the skin and the instrument is inserted through the proper intercostal space by means of the trocar which fits through the sheath of the instrument. The room is darkened to afford better view to the operator.

The process of division of adhesions necessitates complete familiarity with the pleural cavity by the operator and perfect orientation with respect to the tissue to be cut and its relation to other intrathoracic structures. The adhesions must be studied for lung tissue, vessels and the presence of tubercles. Diffuse folds are dangerous because they may obscure large vessels or lung tissue. It may be possible to locate the edge of the lung in an adhesion by having the patient cough, or clear his throat. An uncontrolled cough is exceedingly dangerous during cutting around the vena cavae or aorta or other large vessels, though the heated cautery is a much greater menace than the cold tip used in the electrocoagulation method.

The greatest danger lies in hemorrhage, and several serious and even fatal hemorrhages have been reported. The surgeon feels rather helpless with a vessel viciously spurting and no way to control it except through the small instrument. If the lens is obscured by blood he is indeed helpless, unless the patient can be turned so that the direction of spurt will not cover the lens. Open operation may be necessary to control bleeding if severe. This danger can be almost completely obviated by a careful study of the adhesions, and then well directed coagulation before cutting.

Empyema, the next most feared complication is due to injury to lung tissue. This complication is rapidly decreasing since the hot wire is being less used and the knowledge of lung prolongation into adhesions is better understood.

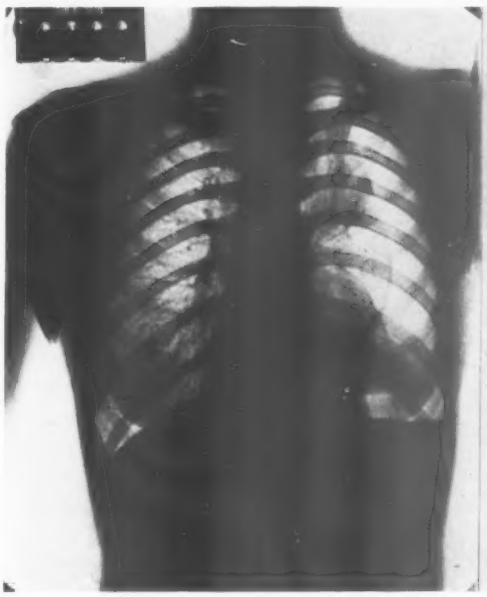

Fig. 2.—A. Infiltration and honey-combing in left upper lobe. Sputum positive, patient not doing well. Upper lobe attached in dome by a V-shaped adhesion.

Fig. 2.—B. After cutting adhesions. Some intrapleural pressure as in A. Upper lobe completely closed, sputum negative, patient gaining weight.

RESULTS. The results are relatively immediate and do not include the end results of the pneumothorax. The results depend entirely on the nature of adhesions selected for operation—provided the operator has the necessary skill. Most incomplete results and failures occur in those cases having thick cord-like and diffuse fold type of adhesions. This same group gives rise to most of the complications. The effect on the underlying tuberculosis depends on the completeness of the pneumothorax

and on any complications that may arise from the cutting of adhesions.

The per cent of clinically successful cases varies between 70 per cent and 90 per cent. The complications and mortality both occur in attempts to divide thick, short, cord-like adhesions and extensive diffuse hands. A thoracoplasty offers the patient a better prognosis than an attempt to divide such adhesions.

A harmless serous effusion follows the operation in 10 to 50 per cent of cases, and usually does not require aspiration. Recent series of 130 cases reports one empyema and one tuberculous exudate.

As many as four cauterizations of adhesions have been done on some cases with no unfavorable results.

The experience with the method herein reported includes thirty-four case with no serious complications and no deaths. Four additional patients were examined by means of the thoracoscope but no cutting was done. One of these had such a maze of adhesions, only a few of which were visible on X-ray, that it was impossible to recognize even the lung and operation would have been hazardous. Another patient had scarcely a square inch of either visceral or parietal pleura that was not covered with

Fig. 3.—A. Most of lesion is in lower portion of upper lobe and middle lobe on right side which is impossible to compress by pneumothorax because of large band-like adhesion.

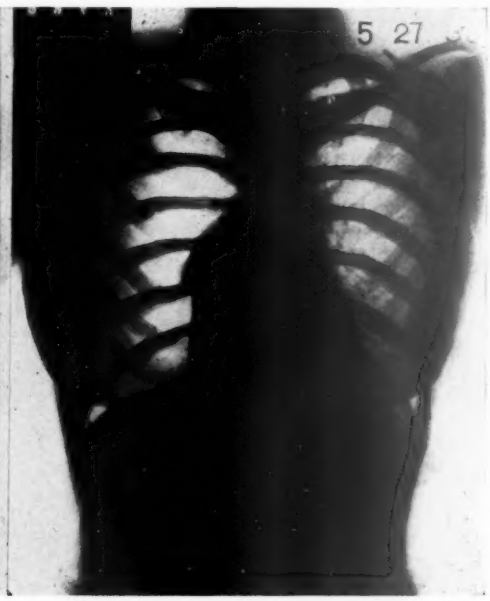

Fig. 3.—B. After cuttng adhesions. Same intrapleural pressure as in A. Lung well compressed. Marked improvement in patient's general appearance, has gained weight, cough and sputum absent.

There were no deaths. There was a former 7 per cent mortality from the empyema following cauterization by Jacobeus-Unverricht instrument. No cases of air embolism have been reported.

Wells[5] reports that in 87 per cent of 141 cases a completely satitsfactory collapse was obtained. Before operation fluid was present in 21 per cent of cases. After operation fluid was present in 24 per cent additional cases. In only two cases out of the entire series was the fluid of any serious consequence. Both of these recovered. There were no hemorrhages and no deaths.

tubercles, and it seemed unwise to attempt to section the thick heavy adhesions that were present. The first ten cases in the series are abstracted briefly to indicate the type of patient selected for this procedure, and the usual post-operative course.

Case I. History No. 93,383, white male, age 21. Began pneumothorax on left side 6/20/30. Adhesions were holding a cavity open. Refills caused pain and sensation of pressure. They were given every eighteen to twenty-one days; 350 c.c. of gas at positive pressure. Sputum repeatedly positive. Some fluid present. On 10/29/31, one large fleshy band

and two string-like adhesions were cut. Some tubercles were noted but none at points of incision.

After operation, pleural pain disappeared, sputum entirely stopped, gained five pounds in weight. Refills now every twenty-eight days; 350 c.c. at negative pressure. Fluid aspirated immediately postoperative. None present now.

Case II. History No. 93,431, white female, age 26. Began pneumothorax on right side 1/24/31. This patient had an incomplete collapse of involved area giving rise to toxic symptoms. Sputum repeatedly positive. Refills every seven to ten days; 400 c.c. at positive pressure. On 10/31/31, two broad irregular bands and two string-like adhesions were cut.

Since operation she has gained two pounds in weight, sputum consistently negative. No fluid either before or after cutting adhesions. Refills now at twenty-one-day intervals; 400 c.c. at positive pressure.

Case III. History No. 93,746, white male, age 34. Began pneumothorax on left side 9/21/29. Gastro-intestinal upsets and pleural pain following gas. Adhesions prevented collapse of involved area and sputum repeatedly positive. Refills every fourteen days; 300-400 c.c. No fluid. On 11/14/31 one string-like adhesion cut. One thick band seen which held lung tissue close to chest wall. An elliptical incision was cut along inferior margin of this adhesion in parietal pleura to allow relaxation of tension on lung.

After operation sputum consistently negative. Weight stationary, trace of fluid for short time; none now. Refills produce no symptoms. Now requires 200 c.c. every twenty-one days.

Case IV. History No. 94,203, white female, age 24. Began pneumothorax on left side 10/26/31. Symptoms, low-grade fever, cough, anorexia, failure to gain weight. Adhesions held open a cavity. Sputum repeatedly positive. Refills of 300 c.c. at positive pressure every three to seven days. On 12/11/31 two bands 4 cms. wide and one string-like adhesion were cut.

After operation toxic symptoms entirely relieved. Gained seventeen pounds in weight. Sputum consistently negative. Refills now 200 c.c. at positive pressure every eighteen days. Fluid present both before and after operation.

Case V. History No. 95,608, white female, age 42. Began pneumothorax on right side 3/10/30. Refills of 250-300 c.c. at positive pressure at seven-day intervals produced marked pressure symptoms, dyspnoea, cough, expectoration, lassitude. Sputum positive. Adhesions hold cavity open, pressure causes mediastinal shifting. On 3/30/32 a large fleshy band which contained lung tissue was partially enucleated from the chest wall. Operation obviously incomplete. Should have another attempt later with approach from different angle. Some fluid present.

After operation symptoms only slightly improved, sputum still positive. Refills now 100 c.c. at positive pressure every seven days.

This patient recently (10/17/32) had another thoracoscopic examination, in the hope that the adhesion might be divided. This was found to be impossible and she should have a partial thoracoplasty to provide the necessary collapse of the cavity.

Case VI. History No. 96,486, white female, age 17. Began pneumothorax on right side 5/30/31. Refills of 450 c.c. at positive pressure every fourteen days. Diseased area incompletely collapsed, general lassitude and progressive loss of weight. Sputum negative after start of pneumothorax. On 4/12/32 a thick cord was found and cut. To this was attached a broad band extending for some distance along the curve of the chest wall. In this band was cut a deep notch as far as it could be reached thereby permitting collapse of the diseased area. After operation there was a general symptomatic improvement. She gained twelve pounds in weight. Refills now 500 c.c. at negative pressure every fourteen days.

Case VII. History No. 98,488, white female, age 24. Began pneumothorax on left side 4/9/32. Sputum negative after 6/1/32. Refills of 400 c.c. at positive pressure every seven to ten days, resulting in pain in shoulder. Some cough, occasional gastro-intestinal upset and anorexia. Patient had marked displacement of mediastinum with embarrassment of opposite lung which was also diseased.

On 7/25/32 a large U-shaped adhesion with a small cord running through the U was divided. The upper portion of the U was also fused with a broad band about 6 cms. wide which was cut, with another narrower band and two string-like adhesions.

After operation cough entirely ceased and general symptoms all disappeared. Gained five pounds

in weight. Trace of fluid following. Refill now 350 c.c. at negative pressure every fourteen days.

Case VIII. History No. 98,752, white female, age 25. Began pneumothorax on left side 5/7/32. Sputum negative. Adhesions hold upper lobe towards apex and prevent adequate collapse. Refills of 300 c.c. at negative pressure every seven days. Appetite poor, failure to gain weight. On 8/11/32 two bands, each about an inch wide and one-eighth inch in thickness, were seen and cut along with a small cord-like adhesion.

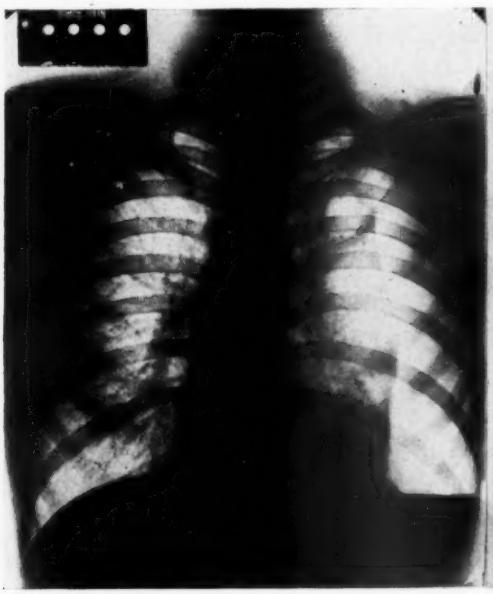

Fig. 4.—A. Large thick walled cavity in left upper lobe held open by a maze of adhesions over the entire dome. Sputum positive.

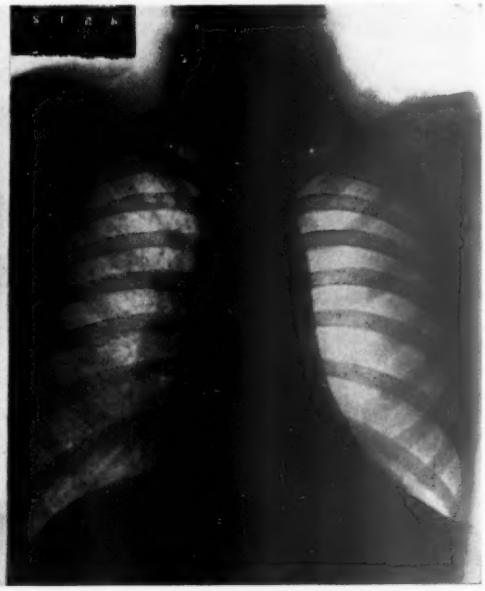

Fig. 4.—B. After cutting adhesions. Same intrapleural pressure as in A. Lung well compressed, cavity almost closed, sputum negative. Gained 60 pounds in six months after cutting adhesions.

After operation there was little change in symptoms in the three weeks patient remained before transferring to another sanatorium. Weight stationary. Patient obtained marked collapse and should be much improved. Refills of 200 c.c. at negative pressure every ten days.

Case IX. History No. 80,250, white female, age 29. Began pneumothorax on left side 10/8/29. Sputum negative after starting pneumothorax. Refills of 200 c.c. at positive pressure every eighteen days. Patient had pleuropericardial adhesions preventing sufficient pressure to give adequate collapse, and marked dyspnoea. On 8/15/32 several very thick adhesions apparently covered with tubercles were seen in apex but no attempt was made to cut them. One broad band and two string-like adhesions were cut, leaving small strip of band posteriorly which was out of reach.

After operation there was slight general improvement, a trace of fluid was present. Weight stationary. Refills of 200 c.c. at positive pressure given at shorter intervals of seven days to push lung down as much as possible and stretch remaining bit of band.

Case X. History No. 99,114, white male, age 47. Began pneumothorax on left side 6/18/32. Sputum repeatedly positive. Adhesions holding open a large cavity in apex. Refills of 500 c.c. at negative pressure every three to four days. Cough and expectoration, fever and general symptoms of toxemia when pressure was lowered. On 8/27/32 a maze of band-like adhesions covering apex of lung from front to back were carefully studied and all cut except a few small ones on medial side of lung. After operation there was some decrease in general symptoms, and sputum is now negative. Refills of 300 c.c. at negative pressure every seven days. Slight amount of fluid present.

The following summary was compiled May 1, 1933:

Earliest Case, October 1, 1931.
Last Case Reported, February 1, 1933.

Number of Cases Operated	34
Exploration Without Operation	4
Total	38
Number of Cases Included in Summary	27
Number of Cases Too Recently Done to Report	7
Total	34
Technically Successful 23 Cases	(85.1%)

ANALYSIS OF CLINICAL RESULTS

Based on Fever, Cough, Sputum, Weight and Efficiency of Pneumothorax.

Improved	24 Cases	(88.8%)
Unchanged	3 Cases	(11.2%)
WEIGHT		
Gain	14 Cases	(51.8%)
Stationary	10 Cases	(37.0%)
Loss	3 Cases	(11.2%)

SPUTUM	*Before Operation*	*After Operation*
Positive for Tubercule Bacilli	19 Cases	9 Cases
Negative for Tubercule Bacilli	4 Cases	14 Cases
No Sputum	4 Cases	4 Cases
Total	27	27

Changed from Positive to Negative 10 Cases (52.5%)

COMPLICATIONS

Hemorrhage (Less than 100 c.c.)	1 Case
Fluid Requiring Aspiration (1 aspiration)	1 Case
Pyogenic or Tuberculous Infection	0
Mortality	0

Absence of complications noted also in four exploratory procedures without pneumolysis; and in seven operative cases since February 1, 1933.

CONCLUSIONS. Sixty per cent of pneumothorax patients have adhesions. It is unjustifiable to maintain an inadequate pneumothorax. If kept up too long, opportunity arises for extension of the disease.

Almost half of all pneumothorax cases may be candidates for this procedure if the adhesions interfere with the proper progress of the cure.

Nearly 90 per cent of the cases operated upon can be definitely improved.

Any patient who shows X-ray evidence of adhesions, and with an unsatisfactory pneumothorax should have the benefit of a thoracoscopic examination before being recommended for thoracoplasty.

"A good pneumothorax is always preferable when it can be obtained with little risk, but a good thoracoplasty is better than a poor pneumothorax."

This operation is not an end in itself. It is a means by which a useless pneumothorax can be converted into an adequate one. The division of adhesions results in closure of cavities, relaxation of tuberculous areas, diminution of sputum with disappearance of tubercle bacilli, cessation of streaking and cough.

Operation requires close cooperation between surgeon and physician in charge of tuberculous patients.

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TYPHUS AND ROCKY MOUNTAIN SPOTTED FEVER.

WARREN F. DRAPER, M. D.,
Richmond, Va.
State Health Commissioner

For the past ten years we have known that typhus and spotted fever were both present in Virginia, typhus being limited largely to the coastal towns and spotted fever occurring in several localities widely scattered throughout the State.

The endemic variety of typhus found in Virginia is transmitted to man from infected rats by rat fleas. The majority of cases occur in the late summer and fall when rat fleas are most prevalent, although occasional cases occur throughout the year. Spotted fever is transmitted by several species of ticks. The Latin name for the tick probably responsible for most of the Virginia cases is *Dermacentor variabilis*. This tick is usually known as the Eastern dog tick or wood tick. These ticks are found most often in the spring and early summer.

They appear in the latter part of March, are most numerous in May, June and the first part of July, rapidly disappearing the latter part of July or early in August. Depending on this seasonal prevalence of ticks we find human cases of spotted fever occurring customarily in the spring and early summer. Occasional cases have been noted at other seasons but this is unusual. In contrast to endemic typhus and its more common prevalence in towns and cities, spotted fever occurs more often in the rural inhabitants or those having rural contacts as picnickers, campers and the like.

Clinically the two diseases have many points in common. The incubation period in endemic typhus varies from six to fourteen days. The onset may be preceded by poorly defined prodromata for a few days but in the majority of cases the disease begins suddenly with chills, fever, headache, and prostration. The appetite is lost and constipation is the rule. The fever rises steadily, each day's maximum exceeding that of the previous day, the highest point being reached in from three to six days. Morning remissions of from 1 to 3° F. occur. The temperature at its maximum seldom reaches and rarely exceeds 105°. The fever terminates usually by rapid lysis about the end of the second week, most often on the fourteenth day, the great majority being afebrile by the sixteenth day. The eruption most often appears on the fifth day, occasionally being noted as late as the seventh. It appears first on the chest and upper abdomen especially over the lower ribs. No extension of the rash from this location may be noted in some of the cases. In one case a total of seven macules were noted, while a second at no time presented more than a dozen and a half lesions. In more pronounced cases the development of the rash is rapid during the first twenty-four hours after its appearance. In cases showing a well marked rash the eruption is also present on the medial surfaces of the upper arms, on the shoulders, over the back, and may extend down the forearm, usually leaving the wrists and hands free. Occasionally in severe cases the rash may involve the thighs and the palms and soles. The face and neck are seldom involved. The rash in the mild cases may persist only two or three days and in the majority of cases disappears by the time the temperature reaches normal. In the rare cases the rash may persist as discolorations for a week or ten days after defervescence. These discolorations may be especially noticeable after taking a warm bath.

The eruption consists of macules two to three millimeters in diameter with rather poorly defined margins. The lesions fade on pressure but may not completely disappear. Occasionally some of the lesions may be maculopapular and occasional cases have been described in which no rash was observed during illness.

The pulse is apt to be slow, seldom exceeding 100 even with a high temperature. During early convalescence the pulse may remain for several days below sixty. This slow pulse may be supplanted by a rate higher than normal for a few weeks after moderate activity is resumed. After several attacks shortness of breath on moderate exertion may be present for a few weeks, suggesting a myocardium weakened by toxaemia.

Headache is almost always present from the beginning. It may involve the whole head but is more commonly frontal and is quite often intense lasting throughout the illness. In other cases headache may never be distressing, being present only a few days. It is occasionally absent throughout the disease. Some degree of mental disturbance is common. This may vary from vivid and not easily forgotten dreams to mild delirium in rare instances. Confusion and disorientation are more apt to be present at night. Lethargy, restlessness, insomnia, irritability may be noted. Tremors and in severe cases subsultus may occur. Generalized aching is often present. Some evidence of respiratory inflammation is common, often showing as a mild unproductive cough. Prostration may be present from the onset and in severe cases becomes quite marked during the second week. Constipation is usually present throughout the course of the disease. Photophobia and soreness of the eye muscles may occur. Slight chills followed by sweats are not uncommon at night. Complications are rare and convalescence in mild cases is speedy. Following the more severe cases normal strength may be regained slowly. In any event recovery is complete. The case fatality is estimated at less than 1 per cent, practically all the deaths occurring in patients over 50 years of age.

The total white cell count usually falls within normal limits or there may be a leucopenia. The urine may show albumin and granular and hyaline casts at the height of the disease. The blood serum

contains agglutinins for *B. proteus* X_{19} in dilutions of 1:160 or more in nearly all cases. The highest titre is usually reached about the end of the second week and may reach a dilution of 1:40000.

The general features of spotted fever are similar to those recounted for endemic typhus but are usually intensified. The incubation period on the whole is somewhat shorter than that seen in endemic typhus, varying in spotted fever from two to twelve days, most often being three to seven days. The onset of spotted fever is like that seen in endemic typhus, but is more severe. Prostration may be marked from the beginning. Restlessness and insomnia are invariable in the severe western cases of the disease and are frequently met in the milder types. Nose bleed frequently occurs. Soreness, often severe, in the muscles and joints is common. The skin is sensitive to the touch. Abdominal pain and soreness occurring at the onset may simulate appendicitis.

The temperature rises somewhat more rapidly in spotted fever than in endemic typhus and is apt to be higher and the morning remissions less marked. The termination of the fever in spotted fever is by lysis as in endemic typhus but the duration is, on the whole, longer. Most of the spotted fever cases will remain febrile beyond the sixteenth day, often terminating about the twenty-first day.

The rash appears between the second and fifth days, usually on the third or fourth. The site of first appearance is important in differentiating the two diseases. As noted earlier, the first appearance of the rash in typhus is on the body, while in spotted fever the eruption is often first noted on the wrists and ankles. The extension of the eruption is rapid, usually first to the back, then arms, legs, chest and last on the abdomen where it is least marked. Unlike typhus, the palms and soles are frequently involved and occasionally the face and even the scalp is included. The eruption is macular at first, becoming fainter or almost disappearing during the morning remissions of fever. The macules become more distinct each day, becoming definitely petechial early in the second week in all but the mildest cases. The spots may become confluent, deep red, and purplish in color. In severe cases areas of necrosis of the skin may occur. This is more common on the scrotum, prepuce, fingers, toes, and lobes of the ears.

In spotted fever the pulse tends to be higher in ratio to the temperature than in endemic typhus. In severe cases, especially those ending fatally, the pulse is usually high, ranging from 130 to 160.

The nervous and mental symptoms are more severe in spotted fever than in endemic typhus. Delirium is more often encountered and coma usually precedes a fatal outcome. Following spotted fever, deafness, visual disturbances, slurring speech, and mental confusion have occasionally been noted for a few weeks. Convalescence is slower in spotted fever than in endemic typhus but in the end is apparently complete. The fatality of spotted fever in Virginia is about 25 per cent.

In spotted fever there is usually a definite leucocytosis. The urine frequently shows albumin and casts at the height of the disease. Usually agglutinins are produced for *B. proteus* X_{19} in a titre of 1:160 or more and a titre of 1:10000 may be reached.

There is no specfic treatment for either typhus or spotted fever. Supportive treatment is indicated with care that an adequate consumption of fluid is maintained. Some physicians recommend caffeine and digitalis as cardiac stimulants in severe cases.

The laboratory does not have a great deal of assistance to offer the clinician in the differential diagnosis between spotted fever and endemic typhus. The total leucocyte count is of some help in differentiating the two diseases from each other while the Weil-Felix is of no assistance in this regard. This agglutination reaction is present in both diseases, usually reaching its height about the end of the febrile period. There is some variation in the response of different serums to different strains of *proteus X* and cases of spotted fever have been encountered which developed no agglutinins in significant amounts for the strains usually employed for diagnostic purposes in this country. An agglutination titre of over 1:160 is generally considered as being of diagnostic significance. We are inclined to regard low titres with some doubt unless reinforced by typical clinical pictures.

PREVENTION

In the prevention of endemic typhus the same measures should be applied which have been found of value in the control of bubonic plague—the destruction of rats and rat harbors. A great deal can be done by the individual in keeping his premises free of rats, by cleaning up accumulations of rub-

bish which may serve as shelter for rats and by preventing access of rats to stored food and garbage.

In the prevention of spotted fever there are three measures which we may use: (1) Avoid ticks; (2) remove ticks from the person as early as possible; (3) be vaccinated.

On camping trips, if it is necessary to sleep in the open, care should be used in selecting a site for placing the bed, as ticks will crawl into a bed laid on the ground. Since ticks are usually most numerous where rodents are most abundant, areas well populated with rodents should be avoided. The safest camping ground is undoubtedly in standing timber where low vegetation is scanty. Proximity to trails and old roads should be avoided. Avoid brushy areas along streams as camping grounds.

Persons should be especially watchful when walking along trails. Ticks tend to concentrate on vegetation along the sides of trails and in the bushes along the edge of wooded areas. Similarly, vegetation along roadsides and grassy strips in the middle of little used roads are often very dangerous. It is especially desirable to watch the clothing when following trails or old roads.

In the prevention of tick bite, the first precaution is the wearing of such clothing as will prevent ticks from getting underneath. This may be accomplished to a considerable extent by wearing high boots, leggings, puttees, or socks that are worn outside the trousers legs. With such precautions taken, most ticks will crawl up the outside of the clothing and can be removed from the neck when contact with the skin makes their presence known. Passing the hand over the neck occasionally to feel for ticks is a good habit to acquire.

Ticks are far more likely to secure a hold on rough clothing than on clothing of smoother texture. There are advantages in both, however. Fewer ticks secure a hold on smooth clothing; but, on the other hand, on cloth with a heavy nap their movements are impeded and are necessarily much slower. If the legs of the trousers are carefully watched, most ticks can be picked off soon after they catch hold.

In spite of precautions, however, a certain number of ticks will reach the body through the various openings in the clothing. It is therefore important that the above precautions be supplemented by the examination of the body and the inside of the clothing. Since ticks seldom attach immediately (unless late in the season), and are seldom infectious until after having been attached for a few hours, such examinations made twice each day (early afternoon and on retiring) should ordinarily be sufficient. In heavily tick-infested areas, however, or in sections known to be particularly dangerous, more frequent examinations should be made. When retiring, a complete removal of the clothing is desirable. Both clothing and body should be examined carefully and, if possible, any clothing not worn at night should be so placed that any undiscovered ticks will be unlikely to crawl from the clothing to the bed. If two or more persons are together they should assist one another in the examination. If the person is alone, the back and other portions of the body that cannot be seen should be explored with the hands, paying particular attention to the hairy portions.

Ticks may be removed from man and domestic animals with the fingers, but a better plan is to use a pair of small forceps or tweezers. With these the tick may be seized by the head, close to the skin, and easily removed. There is no danger of leaving the tick's head embedded in the skin. Care should be exercised against crushing the tick, as the contents of infected ticks are dangerous. After removing or handling ticks, the hands should be washed thoroughly with soap and water.

Two or three inoculations of the vaccine give a degree of protection usually sufficient to last through one tick season, but the immunity apparently is not permanent. Occasional cases of spotted fever have developed in vaccinated persons, but the vaccine apparently lessens the severity of the disease and seems to insure recovery. For its full protective value the vaccine should be taken at least ten days before exposure to tick bite. The vaccine is of no value in the treatment of spotted fever.

We do not recommend this vaccine for general use as the incidence of spotted fever is too low to demand this. We do feel, however, that in localities where cases of spotted fever have occurred the use of the vaccine is worth while. Chief reliance should be placed in removing ticks from the clothing and body before they become attached.

The vaccine is manufactured only by the U. S. Public Health Service and may be procured by application to the State Department of Health.

HOSPITALIZATION BY THE GROUP PAYMENT PLAN.

R. W. GARNETT, M. D.,
Danville, Va.
Health Officer of Danville

In a Health Survey recently conducted in Danville by the Health Department through a CWA allowance, 3,000 white and 1,000 colored families were visited. This work was done by ten women under the direct supervision of Mrs. Iva B. Arvin.

Of the many interesting facts and trends discovered from a study of the questionnaires one of the most significant deals with the question of hospitalization. To the question "Would you favor a good plan of hospital insurance?" 2,200 of the 3,000 white and 825 of the 1,000 colored families surveyed answered "Yes."

This manifestly reveals an interesting and significant trend of opinion on the part of a large percentage of Danville families who desire to provide for the emergency situation that the future may hold for them.

In Danville at the Health Office we have had frequently to deal with trying situations when accidents or the necessity of an operation has brought men who desire to be independent and to meet their own obligations up again the problem of being forced to ask for public aid.

We have long felt that some plan of insurance might be devised whereby hospital bills can be taken care of and the load of city cases be made lighter.

Within recent months a number of cities in the United States are undertaking to solve this same sort of problem, through what is coming to be known as "Hospitalization through the group payment plan."

The plan in principle provides that an organization be set up and those desiring it to be given opportunity to join by payment of an admission or membership fee of, say $2.00, and then monthly dues of, say $1.00 per month for single persons with a small additional amount for each member of his family.

Each subscriber to such a Hospital Service is entitled to admission to the member hospital of his choice when necessity for hospitalization arises, the decision as to the necessity and as to the length of stay being determined by himself and his private physician. When the member leaves the hospital, the bill is paid by the secretary of the fund.

The plan as developed in this country does not cover bills for doctors services, but covers only hospital bills. There is absolutely no interference with freedom of choice of physician. The matter of the doctors professional service and the payment for the same is entirely private and personal. It is found that this plan frees patients from worry as to how the hospital bill is to be met.

Membership in such a group usually entitles a member to from twenty-one to forty-two days hospitalization in any one year. The advantage of the plan from the standpoint of both the participating hospitals and the patients should be apparent. The hospital is assured prompt payment of its bills and it is being found that the income of hospitals under this plan is very considerably increased.

Experience shows that one person out of fifteen in such insured groups requires hospitalization during any one year. To that one this plan lifts what is often a very heavy burden of worry as well as a financial obligation. The other fourteen are, of course, fortunate in not needing hospitalization and have probably not missed very much the small amounts paid monthly into the Hospital Fund.

In an article published in *"Modern Hospital,"* Michael M. Davis tells us of the development of a plan of this nature in England whereby working men are able to pay their own hospital bills to a much greater extent than is done in America. Birmingham, for example, with a population of over one and a half million shows that 432,000 belong to a hospital association. Birmingham is only one of many places in England from London down to the small towns covering about one-fifth of the entire population.

In Charleston, W. Va., "Hospital Service, Inc.," covers seven hospitals. Here a membership fee of $2.00 is charged and $1.00 per month for the head of the family and small additional amounts for each additional member of the family. This service pro-

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vides semi-private accommodations together with meals, general nursing care, use of operating room, needed anaesthetic, three X-ray pictures to one illness or injury and all laboratory service together with routine medicines, routine surgical dressings, hypodermics, casts and operating room supplies.

Service is effective as follows: for accidental injury, immediately after becoming a member; for sickness, fifteen days after becoming a member; for tonsil and adenoid cases, conditions existing at the time of becoming a member, chronic and incurable conditions and diseases or illnesses peculiar to women, six months after becoming a member.

Dr. Harold Glascock, of Raleigh, N. C., writes in answer to an inquiry, "We think, and nearly everyone who has seen the set-up seems to think, it is one of best planned organizations in this field of work. The organization is progressing nicely here. I feel that it is a great step forward in the hospital game. It will go a long way in accomplishing things in hospital work."

Mr. John Hart, Secretary-Manager of Hospital Service, Inc., Charleston, W. Va., writes, "Our plan has been in operation since January 1, 1933, and has enjoyed very satisfactory growth despite many obstacles which we have had to overcome. New members are now being enrolled at a rate in excess of two hundred per month and we are quite confident of the general acceptance and approval of this plan by the public throughout this area.

There are a large number of families, especially in our industrial communities, who are living on or below the economic borderline and to whom illness and debt are a constant specter.

To some, when the need for hospitalization arises, this means putting off operations or special treatment; to others, it means calling on the city or on charity. To others it means borrowing under very unfavorable conditions, often at high rates of interest in order to meet an emergency.

Many patients in hospitals feel harassed and worried as to how the bill is to be paid, a state of mind which naturally retards recovery.

To physicians, to hospitals and to that great in between group of people who want to be independent and meet their own obligations,—people who do not want charity and who do not have financial reserves—some wise plan of hospital insurance appears to be greatly needed.

To physicians it should be reassuring to know that the patient does not have to worry about hospital bills.

To hospital managements, the assurance afforded of more adequate financial income often is urgently needed.

The setting up and carrying on of a wise plan of hospital insurance will, of course, be a difficult undertaking. The overhead costs must be kept as low as possible and commercialization guarded against.

To the public health official, good hospital service is a tremendously important factor in the organization necessary to promote and conserve our vital human resources. To have this scientific service brought within the reach of all the people is an ideal toward which all the elements in the modern community must strive.

Its realization will require that public health officials, physicians, hospital superintendents, leaders of industry and Mr. Average Man work together in a spirit of cooperation toward the end that adequate medical and surgical hospital service be brought within the reach of all, through the operation of a plan whereby each pays his part.

Will insurance or "Hospitalization by the group payment plan" prove to be the answer to these important questions?

Woman's Auxiliary, to the Medical Society of Va.

President—MRS. WILLIAM LETT HARRIS, 1112 Matoaka Street, Norfolk.

President-Elect—MRS. JOSEPH BEAR, 3012 Monument Avenue, Richmond.

Recording Secretary—MRS. FLETCHER J. WRIGHT, 49 South Market Street, Petersburg.

Corresponding Secretary—MRS. CHARLES A. SAUNDERS, 1000 Gates Avenue, Norfolk.

Treasurer—MRS. REUBEN F. SIMMS, 2034 Park Avenue, Richmond.

The National Meeting.

The annual meeting of the Auxiliary to the American Medical Association is uppermost in the minds of many at this time. This is to be held in Cleveland, Ohio, June 11th-15th, under the presidency of Mrs. James Blake, of Hopkins, Minn. A

very capable group of doctors' wives, under the able supervision of Mrs. Clyde L. Cummer, has charge of the social affairs for the convention. The tentative program of entertainment is as follows:

MONDAY, JUNE 11th—
Luncheon of the Auxiliary Board at Hotel Carter.
Dinner in honor of past presidents and board at Hotel Carter.

TUESDAY, JUNE 12th—
Luncheon, Bridge and Style Show, Lake Shore Hotel.

WEDNESDAY, JUNE 13th—
Auxiliary Luncheon at the Hotel Carter.

THURSDAY, JUNE 14th—
Luncheon at Country Club, Sight-seeing Tour.
"Bring-Your-Husband Dinner"—Hotel Carter.

FRIDAY, JUNE 15th—
Women's Golf Tournament, Wentwood Country Club.

Along with this splendid social program, which is entirely in the hands of the wives of the Cleveland members of the American Medical Association, will go a program of business planned and directed by the Auxiliary. The reports to be heard and the business to be transacted this year are of such import that the meeting cannot help being of exceptional interest to every Auxiliary member.

Mid-Tidewater Auxiliary.

The recently organized Auxiliary to the Mid-Tidewater Medical Society met at Saluda, Va., on April the 26th, at the time of the quarterly meeting of the doctor's organization. The ladies met in the home of Dr. and Mrs. Horace F. Hoskins and, after a business session, were entertained at luncheon by Mrs. Hoskins, at the hotel. Officers elected at this time are: President, Mrs. Hawes Campbell, Enfield; vice-presidents, Mrs. A. Warner Lewis, Aylett, and Mrs. Horace F. Hoskins, Saluda; secretary, Mrs. M. H. Harris, West Point. The next meeting will be held in Gloucester in July.

Richmond Auxiliary.

On the evening of May 16th the Auxiliary to the Richmond Academy of Medicine sponsored a play "Guests at Garrygrath" which was given by the Little Theatre League. This was particularly appreciated because the play is a production of Mrs. Frank L. Apperly, wife of a Richmond physician. Mrs. Apperly directed the play as well as acted as a member of the cast. The Richmond Auxiliary is most fortunate in having Mrs. Apperly who recently came to Richmond from Australia, as a member of their group.

The proceeds of the performance will go toward the pathological museum which is a new undertaking of the Richmond Academy.

Public Health Statistics

WARREN F. DRAPER, M. D.
Health Commissioner of Virginia

The communicable disease report received at the office of Dr. G. F. McGinnes, State Epidemiologist, during April, 1934, showed the following cases: Typhoid and Paratyphoid, 17; Diphtheria, 64; Scarlet Fever, 112; Measles, 5,713; Chickenpox, 341; Meningitis, 10; Poliomyelitis, 0.

The number of cases of typhoid and paratyphoid fever reported from the following counties were: Accomack 1; Alleghany 1; Augusta 1; Bedford 1; Brunswick 1; Buchanan 1; Lancaster 1; Lunenburg 1; Mecklenburg 1; Rappahannock 1; Russell 1; Tazewell 1; Lynchburg City 1; Richmond City 4.

Epidemic Meningitis was reported from: Alleghany 1; Dickenson 4; Rockbridge 1; Spotsylvania 1; Washington 1; Wise 1; Danville City 1.

The number of cases of diphtheria has decreased from 121 cases in March to 64 cases in April. They were scattered in 26 counties and 7 cities.

Scarlet Fever has likewise showed fewer cases—204 in March and 112 in April. They were reported from 40 counties and 8 cities.

There were 1,200 fewer cases of measles. Measles was reported from 89 counties and 10 cities.

Chickenpox was reported in 38 counties and 10 cities.

Typhus and Rocky Mountain Spotted Fever.* As this review goes to press two cases of Rocky Mountain Spotted Fever occurred in the same household in Richmond County, one of which died. During 1933, 23 cases were reported in Virginia, with 4 deaths.

*See article by Dr. W. F. Draper, on page 171.

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Editorial

Pituitary Hormones.

Among the endocrines, the knowledge of which has been marvelously expanded during the past ten years, probably most progress has been made in the understanding of the function of the pituitary. We now know of eight separate active hormones peculiar to this small gland. Any day we may be introduced to others. It staggers the imagination to think of the possibilities of the further development of knowledge concerning the function of only a few of them. Here in this gland, as Dr. R. J. Main shows in his important contribution to this issue of the MONTHLY, is initiated the mystery of growth, the riddle of the menstrual cycle and its aberrations, as well as the secret of lactation. Here also may lie long sought explanations bearing on the pathogenesis of exophthalmic goiter, prostatic hypertrophy, and diabetes, as well as new light on adrenal function. We only await potent, reliable and pure extracts of these various hormones to reach the full clinical rewards of these epoch-making discoveries of animal research.

The Richmond Academy of Medicine Acts.

At a recent meeting of the Richmond Academy of Medicine its Committee on Economics headed by C. C. Coleman brought in a report that may have far-reaching consequences not only in the city of Richmond but throughout the State of Virginia. The full report covers some seventy-five pages and bespeaks an exhaustive investigation of a subject that is foremost in the medical thought of today. Its recommendations are as follows:

1. We recommend the continuation of a Committee on Medical Economics and Distributions of Medical Services, with power to appoint, in cooperation with the President of the Academy of Medicine, such sub-committees as may be necessary to study the various subdivisions of the problem of medical care as indicated in this and similar reports made in other cities. . . . We believe that prompt consideration should be given to the formation of as many of these sub-committees as is deemed necessary by the Academy.

2. We recommend that the cooperation of the Academy be offered to the City Department of Public Welfare with a view to (A) reorganization of the system of medical care of the indigent in their homes; (B) to the solution of certain controversial matters relating to complaints of interference by the Department of Public Welfare with private practice; (C) assistance to other agencies directed by the Department of Public Welfare and concerned in the medical treatment of the indigent patient.

3. We recommend that the Academy formu-

late plans for group hospital insurance, with the safeguards tabulated in the report, and with due regard to the economic soundness of such plans.

4. We recommend that the Academy use its influence through the proper channels to bring about a reduction in the number of admissions to the medical schools. There is an over-supply of physicians at the present time for adequate medical care, even with reasonable distribution of the physicians according to the local needs. The general over-supply shows an annual increase, according to reliable statistics.

5. We recommend that the Academy endorse and actively support plans for post-graduate medical education in Richmond and that it co-operate with plans which may be formed in other sections of the State.

The report and its recommendations were approved without a dissenting voice and sub-committees were immediately set up to carry forward the task projected by the central committee. Most significant is the Academy's unanimous approval of the principle of insurance. Still more to the point, instructions have been given the committee to prepare and present immediately for approval a plan for hospital insurance. It appears fairly well assured, therefore, that group hospital insurance on a city-wide basis will be in operation in Richmond within a few months.

Hospital Insurance.

Elsewhere in this issue of the MONTHLY appears a discussion of hospital insurance by the Health Officer of Danville where a health survey among 4,000 families has just been completed. Of particular interest is the fact that when asked if they favored a plan of hospital insurance two-thirds of the families questioned in the survey answered in the affirmative. Hospital insurance is being considered in several sections of the State at the present time and the plan appears to be gaining favor rapidly with the profession of Virginia.

Typhus and Rocky Mountain Spotted Fever in Virginia.

Both of these diseases occur in Virginia more frequently than is generally realized. They may be confused one with another or with other eruptive fevers. Since wood and dog ticks, known to convey Rocky Mountain Spotted Fever, flourish chiefly in the spring and early summer months, our rural population as well as campers from the cities should be on their guard from now on against the bite of these inhabitants of bushes and grass. We have been accustomed to think of typhus as louse-borne and therefore a disease of winter crowding, but the work of Allan, Maxcy and others in the South has suggested the possibility of transmission through rodents and the common rat flea, another summer-time menace. As we approach the open season for both these pests, readers of the MONTHLY will do well to ponder carefully the differential diagnosis and preventive measures outlined elsewhere in this issue by Dr. Warren F. Draper, State Health Commissioner.

Gradenigo's Syndrome.

A persistently discharging ear with or without mastoiditis, unilateral frontal headache, and homolateral abducent paralysis, constitute the symptomatic triad first pointed out by Gradenigo and recently to the fore in otological discussions. These symptoms are said to be indicative of an infection extending from the middle ear or the mastoid into the petrous pyramid. Petrositis produces inflammatory reactions in adjacent structures—pressure on the ophthalmic branch of the facial nerve and on the sixth nerve as it traverses the canal of Dorello. It can readily be appreciated that an infection in this area cannot be approached surgically without considerable hazard. While Eagleton, Kopetski and others are leading the way to a better understanding of this more recently recognized otological complication and are developing operative procedures designed to "unlock the petrous pyramid," practitioners in general may take comfort in the knowledge that there is ample evidence to show that many cases have responded satisfactorily to conservative treatment.

XUM

Department of Clinical Education of the Medical Society of Virginia

Post-Graduate Clinic Held at Medical College of Virginia.

This year the Post-Graduate Clinic given by the Medical College of Virginia in cooperation with the Medical Society of Virginia was combined with the Stuart McGuire Lectures.

Dr. Frank C. Mann, of the Mayo Foundation, Rochester, Minnesota, gave the Stuart McGuire Lectures. On Monday night, April 2nd, his subject was "The Anatomy and Physiology of the Liver." On Tuesday night, April 3rd, Dr. Mann lectured on the "Experimental Pathology of the Liver."

On Tuesday, clinics by the Departments of Pediatrics, Obstetrics, Surgery and Medicine were held in the morning from 10:00 A. M. to 1:00 P. M. In the afternoon ward rounds in the same departments were conducted. From 4:00 to 5:30 P. M. a round-table discussion on "Medical Economics" was conducted. There was very much interest manifested in this round-table.

The clinic attendance this year was very satisfactory, both from the standpoint of numbers and interest on the part of those attending. The following is a list of those registering:

Dr. O. T. Amory, Newport News.
Dr. C. H. Armentrout, Flint Hill.
Dr. G. B. Barrow, Staunton.
Dr. C. D. Bennett, Chatham.
Dr. E. W. Bennett, Elizabethtown, N. C.
Dr. J. M. Bowling, Durham, N. C.
Dr. T. L. Brooks, Oceana.
Dr. H. G. Byrd, Louisa.
Dr. B. L. Carlston, Elizabethtown, N. C.
Dr. Wright Clarkson, Petersburg.
Dr. C. B. Courtney, Newport News.
Dr. H. S. Daniel, Louisa.
Dr. G. A. Ezekiel, Richmond.
Dr. J. E. Fulghum, Louisburg, N. C.
Dr. T. L. Gemmill, Petersburg.
Dr. S. E. Gunn, Hopewell.
Dr. H. T. Hawkins, Waynesboro.
Dr. J. D. Hagood, Clover.
Dr. C. L. Haywood. Durham, N. C.
Dr. R. L. Hillman, Emory.
Dr. J. Allison Hodges, Richmond.
Dr. W. Hollister, Kunson, Korea.
Dr. B. A. Hopkins, Stuart.
Dr. J. Shelton Horsley, Richmond.
Dr. John Hundley, Jr., Lynchburg.
Dr. C. H. Iden, Berryville.
Dr. D. M. Kipps, Front Royal.
Dr. E. G. Kyle, Newton Falls, Ohio.
Dr. Herbert Lewis. Dumbarton.
Dr. R. H. Manson, McKenny.
Dr. E. S. McDowell, Plattsburg, N. Y.
Dr. G. W. Mitchell, Wilson, N. C.
Dr. J. J. Neal, Danville.
Dr. Dan O. Nichols, Charlottesville.
Dr. Louis Perlin, Richmond.
Dr. Robert S. Preston, Richmond.
Dr. T. G. Pretlow, Chester.
Dr. J. N. Reeves, McKendree, W. Va.
Dr. J. E. Richardson, Axton.
Dr. Irwin Rifkin, Richmond.
Dr. E. B. Robertson, Danville.
Dr. J. L. Rawls, Suffolk.
Dr. A. M. Sneed, Toano.
Dr. A. U. Stroupe, Jr., Mount Holly, N. C.

Regular Spring Clinic at University of Virginia Hospital.

The thirteenth in the series of post-graduate clinics at the University of Virginia Hospital was held on Thursday and Friday, May 17th and 18th. A clinical-pathological conference, conducted by Dr. Louis Hamman, of Baltimore, was a special feature of the program, which included clinics on fractures by Drs. E. P. Lehman and R. V. Funsten, routine handling of cases of the Out-Patient Department by the staff of the newly organized tumor clinic, communicable diseases by Drs. K. F. Maxcy and W. W. Waddell, hay-fever by Dr. Oscar Swineford, Jr., and a problem child clinic by Dr. D. C. Wilson. For the evening meeting on Thursday the time-honored custom was adhered to of a round-table discussion, led by members of the staff, of topics submitted by the visiting physicians.

Below is a list of the visitors registered for the clinics:

Dr. C. H. Armentrout. Flint Hill.
Dr. Howard Armstrong, Harrisonburg.
Dr. H. L. Baptist, Ivy.
Dr. R. E. Booker, Lottsburg.

Dr. D. P. Bowman, Crimora.
Dr. H. S. Chelf, Culpeper.
Dr. C. E. Conrad, Harrisonburg.
Dr. J. C. Coulter, Charlottesville.
Dr. F. R. Crawford, Farmville.
Dr. H. S. Daniel, Louisa.
Dr. E. D. Davis, Standardsville.
Dr. E. S. Elliott, Independence.
Dr. S. E. Gunn, Hopewell.
Dr. Percy Harris, Scottsville.
Dr. W. F. Hartman, Swoope.
Dr. J. F. Hubbard, Waynesboro.
Dr. D. M. Kipps, Front Royal.
Dr. W. A. Kyger, Free Union.
Dr. Anita Lotti, Charlottesville.
Dr. J. E. Loyd, Natural Bridge.
Dr. S. G. Miller, Piney River.
Dr. Rees Morgan, Roanoke.
Dr. E. J. Moseley, Jr., Richmond.
Dr. J. M. Mundy, Charlottesville.
Dr. W. A. Murphy, Staunton.
Dr. E. B. Nuckols, Cumberland.
Dr. W. H. Paine, Charlottesville.
Dr. C. E. Peterson, Roanoke.
Dr. M. J. Payne, Staunton.
Dr. B. A. Rice, Forest.
Dr. L. G. Roberts, Moormans River.
Dr. Alex. F. Robertson, Jr., Staunton.
Dr. C. W. Rodgers, Staunton.
Dr. R. M. Shelton, Unionville.
Dr. J. P. Snead, Jr., Sperryville.
Dr. H. B. Spencer, Lynchburg.
Dr. R. M. Taliaferro, Lynchburg.
Dr. J. F. Thaxton, Tye River.
Dr. J. J. Waff, Shenandoah.
Dr. W. H. Walters, Roanoke.
Dr. Harold B. Webb, Waynesboro.
Dr. B. K. Weems, Waynesboro.
Dr. H. F. White, Fishersville.
Dr. Hunter Williams, North Garden.
Dr. John E. Womack, Staunton.

Planning for Pediatrics Courses Continues.

The Pediatric Society of Virginia, through Dr. Thomas D. Jones, has reassured the Department of Clinical Education of its willingness to cooperate in arranging clinics or courses. It has felt, however, that the original intention of using members of the Society for three days as instructors in the courses must be changed so that not more than a day at a time would be required of any clinician.

The tentative list of topics suggested as those that would always prove interesting includes: Infant feeding; respiratory infections; gastro-intestinal disturbances; communicable diseases; nutrition, including the various nutritional disturbances; mental hygiene; heart diseases; and acute infections of the central nervous system.

At the last report the funds voted by the Medical Society at Lynchburg for an experimental program of pediatrics courses have been decreased by small incidental expenses to the sum of $368.45. This amount, plus any fees which may be required of members of the courses, will mean a severely limited program. In the lack of other resources not now in prospect, it is anticipated that the Department of Clinical Education can perhaps best attempt courses of eight meetings located in four towns or cities not too close to medical centers, or conduct one-day pediatric clinics at several points in cooperation with local societies.

Members of the Department of Clinical Education are engaged in seeking the wisest solution to the problem. They invite the suggestions of the profession and promise an active even if restricted program when plans can be fully developed.

Courses in Prenatal and Postnatal Care to be Resumed in July.

The temporary services of Dr. M. E. Lapham, Field Clinician of the Joint Committee on Prenatal and Postnatal Instruction, were requested last fall for a brief survey of conditions in maternity cases in a Tennessee county. By action of the Gibson County Medical Society, the survey was authorized in April, and Dr. Lapham's application for leave from June 2nd to July 9th was granted by the executive committee of the Joint Committee.

The period falls between the ninth circuit in the Northern Valley, which will be completed at the end of May, and the tenth circuit of classes proposed for northeastern Virginia.

Another new group of advance enrollments for a course in the tenth circuit, furnished to the Joint Committee by Dr. H. A. Latane, will establish a study center in Alexandria. The initial enrollments include the following: Drs. W. E. Beattie, W. H. Janney, H. A. Latane, J. W. Love, S. B. Moore, Llewellyn Powell, W. C. West, W. B. Wilkins.

GEO. W. EUTSLER,
Secretary Joint Committee and Executive Secretary Department of Clinical Education.

Proceedings of Societies

The Bedford County Medical Society

Recently reorganized, with Dr. C. H. Bondurant, of Bedford, as president, and Dr. J. A. Rucker, also of Bedford, as secretary-treasurer.

At this meeting, the following papers were presented: History of Medicine During the Past 125 Years by Dr. E. L. Johnson, of Bedford; Transurethral Resection by Dr. S. Beverly Cary, of Roanoke, and Diabetes by Dr. C. D. Nofsinger, also of Roanoke.

Hereafter meetings will be held quarterly.

The Mecklenburg County Medical Society

Met at Clarksville, Va., for a supper meeting on May the 8th. This Society has the record of having enrolled all doctors in the county and ten of the fourteen were present. Following a six o'clock supper, papers were presented by Dr. J. M. Hutcheson, Richmond, on Cardiac Therapy; Dr. Frank Johns, Richmond, on Experience in Handling Acute Appendicitis; Dr. R. H. Fuller, South Boston, on Report of Some Cases of Mistaken Diagnosis in Acute Abdomen; and Dr. W. R. Bracey, Richmond, on Cancer of the Lung. Dr. H. H. Braxton, of Chase City, was present and elected to membership in the Society. It was decided to hold the fall meeting in Chase City.

Dr. L. H. Bracey, South Hill, is president of the Society, and Dr. W. W. Wilkinson, La Crosse, secretary.

The Post-Graduate Medical Society of Southern Virginia

Held a clinical meeting on May 15th, at the Southside Hospital in Farmville, Va., with an attendance of about fifty physicians. Dr. W. D. Prince, Stony Creek, is president, Dr. Herbert C. Jones, Petersburg, secretary, and Dr. Wright Clarkson, Petersburg, chairman of the Steering Committee. Dr. Lawrence P. Jones, North Emporia, was elected to membership.

The program included papers by Dr. S. W. Budd, Richmond, on Sickle Cell Anemia; Dr. William B. Porter, Richmond, on Blood Dyscrasias, both of which had lantern slides; Dr. C. S. Dodd, Petersburg, on Eye, Ear, Nose and Throat Conditions Frequently Seen in General Practice. Case reports were also presented by Dr. Allen Barker and Dr. J. Bolling Jones, both of Petersburg. This program was followed by a Round Table discussion of Medical Economics, led by Dr. Wyndham B. Blanton, of Richmond.

The Mid-Tidewater Medical Society

Held its regular quarterly meeting in Saluda, Va., April 26th, with the president, Dr. Robert R. Hoskins, Mathews, presiding. There was a large attendance of members and visitors. The subject for discussion was "Varicose Veins and Treatment for Same." Drs. W. W. Rixey and Dr. D. S. Daniel, both of Richmond, were guest speakers.

The next meeting of the Society will be held in Gloucester in July.

Patrick-Henry Medical Society.

The regular quarterly meeting of this Society was held at Stuart, Va., April 5th, Dr. J. T. Shelburne, president, presiding.

Dr. J. Russell Perkins, of Winston-Salem, N. C., invited guest, spoke on the Management and Treatment of the Acute Middle Ear. Dr. W. C. Akers, of Stuart, Va., gave a paper on Some Interesting Surgical Cases.

The meeting was preceded by a banquet at Hotel Perkins, at which time Mr. J. D. Hooker, Mayor of Stuart, welcomed the doctors to the town.

The Society will hold its next meeting in July at Martinsville, Va.

Dr. C. R. Titus, Bassett, is secretary of this Society.

The Lynchburg Academy of Medicine, Inc.,

Held its May meeting on the 7th, at which time resolutions of respect were passed, regretting the death of Dr. William H. Welch, of Baltimore.

Dr. Carrington Williams, of the McGuire Clinic, Richmond, Va., presented a series of cases illustrating "Lesions of the Stomach," demonstrating each case with lantern slides. The presentation was very instructive and well received by the members present.

Dr. James Morrison is president and Dr. John Hundley, Jr., secretary of the Academy. Both are of Lynchburg.

The Augusta County Medical Association, Inc.,

Held its usual quarterly meeting at the Y. M. C. A. Building, Staunton, Va., on the afternoon of May the 2nd. The features of this meeting were clinical case reports and a paper by Dr. Frank P. Coleman, of Stuarts Draft, on Case Reports in the Treatment of Internal Hemorrhoids by the Injection Method.

Dr. H. T. Hawkins, Waynesboro, is president, and Dr. W. F. Hartman, R. F. D., Staunton, secretary.

South Piedmont Medical Society.

The regular Spring meeting of this Society was held in South Boston, Va., April 17th, under the presidency of Dr. F. O. Plunkett, Lynchburg. There were a number of interesting papers on the program and supper was served between the afternoon and evening sessions.

At the business meeting, the following officers were elected: President, Dr. George A. Stover, South Boston, who has been the efficient secretary of this organization for a number of years; vice-presidents, Dr. C. D. Barksdale, Sutherlin; Dr. C. D. Bennett, Chatham; Dr. H. H. Hurt, Lynchburg; and Dr. L. H. Hoover, Clarksville; secretary-treasurer, Dr. John A. Owen, Turbeville.

Officers in Local Societies,

Not previously reported, are:

ALLEGHANY-BATH

President—Dr. S. P. Hileman, Millboro.

Secretary—Dr. R. P. Hawkins, Jr., Clifton Forge.

DANVILLE-PITTSYLVANIA COUNTY

President—Dr. S. E. Hughes, Danville.

Secretary—Dr. P. W. Miles, Danville.

News Notes

The Virginia Society of Oto-Laryngology and Ophthalmology

Held its annual meeting in Lynchburg, Va., May the 5th, under the presidency of Dr. H. Grant Preston, Harrisonburg, with Dr. Edwin W. Burton, University, as secretary. A scientific program of much interest was presented. At this meeting, plans were brought to the attention of the members for the establishment of a post-graduate course in eye, ear, nose and throat at the University of Virginia. The idea was heartily endorsed by the Society and plans are now under way for the establishment of such courses before the next meeting of the Society. The exact dates have not been decided but the courses will be of an intensive nature and will last over a period of four or five days. The members felt that there was a definite need in the State for such courses.

The following officers were elected for the ensuing year: President, Dr. B. R. Kennon, Norfolk; vice-president, Dr. E. W. Burton, University; and secretary-treasurer, Dr. G. G. Hankins, Newport News. The date and place of next meeting will be named later.

News Notes from the Medical College of Virginia.

Commencement exercises closing the ninety-sixth session of the Medical College of Virginia were held at the Mosque Theatre, Tuesday evening, May 29th, at eight o'clock. Dr. Francis Pendleton Gaines, President of Washington and Lee University, Lexington, Va., was the speaker.

The commencement sermon was given Sunday evening, May 27th, at eight o'clock, by Dr. Churchill J. Gibson, Rector, Saint James Episcopal Church.

The honorary degree of doctor of science was conferred upon Dr. R. B. Teusler, Director of Saint Luke's International Medical Center, Tokyo, Japan. Dr. Teusler is an alumnus.

There were a number of graduates from the various departments, this year, representing eleven states, two foreign countries, and fifty-nine of the one hundred counties in Virginia. A list of the graduates in medicine, with their hospital appointments, will be given in the next issue of the MONTHLY.

The enrollment for the session in all schools and departments was 716; 347 in medicine, 107 in

dentistry, seventy-six in pharmacy, and 186 in nursing. The student body represented twenty-three states, four foreign countries, and seventy-nine of the counties of Virginia.

News from University of Virginia, Department of Medicine.

On April 13th Dr. John H. Neff spoke before the Ohio County Medical Society, meeting in Wheeling, W. Va., his subject being Experience with Malignant Tumors of the Kidney.

Recent visitors at the Medical School were Dr. Albert E. Casey, of the Rockefeller Institute for Medical Research, and Dr. Samuel Detweiler, Professor of Anatomy at Columbia University.

On April 17th Dr. J. Edwin Wood spoke on Recent Advances in the Study of Hypertension, at the meeting of the South Piedmont Medical Society.

On April 18th Dr. C. C. Speidel gave the Sigma Xi lecture at Ohio University, Athens, Ohio; he spoke on Growth, Irritation and Repair of Nerves. On April 20th he delivered this lecture before the Honor Biology Society of Washington and Lee University.

At the time of the annual meeting of Sigma Xi on April 25th, the John Horsley Memorial Prize, established in 1925 by Dr. J. Shelton Horsley, of Richmond, Va., as a memorial to his father, was awarded to Dr. Oscar Swineford, Instructor in Medicine at the University of Virginia, for his paper on The Specific Control of Experimental Serum Reactions. This prize is awarded every two years by a Committee of the Medical Faculty for a thesis upon some subject related to general surgery. The address of the meeting was given by Professor George H. Parker, National President of Sigma Xi and Director of the Zoological Laboratories of Harvard University, on the subject of "The Transmission of Neurohumors." The President and Visitors Prize was awarded to Dr. C. C. Speidel for his paper on Studies of Living Nerves. II. Activities of Ameboid Growth Cones, Sheath Cells, and Myelin Segments, as revealed by prolonged observation of Individual Nerve Fibers in Frog Tadpoles. Dr. Speidel has now won this prize for two years in succession.

The Virginia State Dental Association held its annual meeting in Charlottesville on April 30th to May 2nd. On the final day clinics, planned to cover the field of Medicine with reference to Dentistry, were held at the Medical School.

On April 24th Dean J. C. Flippin and Dr. J. R Cash gave a joint paper before the Richmond Academy of Medicine, on Autopsy Findings in Certain Cases of Jaundice. Dr. J. H. Neff spoke on the subject of Renal Calculi; Dr. S. W. Britton on the Physiology of the Suprarenal Gland.

On April 26th Dean J. C. Flippin spoke before the Northern Virginia Medical Society at Flint Hill on the subject of Clinical Diagnosis of Digestive Disorders.

At the meeting of the University of Virginia Medical Society on May 7th, Dr. E. M. K. Geiling, Professor of Pharmacology at the Johns Hopkins Medical School, gave a lecture on Some Newer Studies in Connection with the Function of the Posterior Lobe Hormone.

Dr. L. Floyd Hobbs,

Class of '32, University of Virginia, Department of Medicine, who interned at the University Hospital, has located at Jewell Ridge Va., where he is engaged in general practice.

Information Desired Concerning Congenital Malformations.

Mothers of congenitally malformed infants frequently ask "If I should give birth again, what is the chance that my next child will also be defective?" In an attempt to answer this question, the Gynecean Hospital Institute of Gynecologic Research of the University of Pennsylvania is conducting an intensive study of families into which congenitally malformed individuals have been born.

Special interest centers in families in which malformations have appeared in two or more children. Physicians who have knowledge of any such families are urged to communicate with: Dr. Douglas P. Murphy, Gynecean Hospital Institute, University of Pennsylvania, Philadelphia, Pa.

Dr. D. Edward Watkins,

Of the class of '31, University of Virginia, Department of Medicine, located at Waynesboro, Va. April the 1st, where he is associated with Dr. B. K.

Weems, for the practice of medicine and surgery. Dr. Watkins was on the surgical service at Memorial Hospital, Richmond, in 1931-32, and at Elizabeth Buxton Hospital, Newport News, Va., from the completion of that service through March of this year.

New Books Available to Members.

The following is a list of some newer books in the Library of the Medical College of Virginia, Richmond, which may be borrowed by members of the Medical Society of Virginia, the only charge being return postage:

Best, Harry—Blindness and the Blind in the United States.
Cabot—The Meaning of Right and Wrong.
Conybeare, J. J., ed.—Textbook of Medicine by various authors.
Darwin, Charles—Diary of the Voyage of H. M. S. Beagle.
Evans, H. M., et. als.—The Growth and Gonad-Stimulating Hormones of the Anterior Hypophysis.
Gardener—Essentials of Bacteriology.
Groves & Blanchard—Introduction to Mental Hygiene.
Groves—Marriage.
Guttmacher, A. F.—Life in the Making.
Harding—The Way of all Women.
Hollingworth—Psychology of the Adolescent.
Kilpatrick—Education for a Changing Civilization.
Kofoid, C. A., ed.—Termites and Termite Control.
Lynde—Everyday Physics.
Noyes, Arthur P.—Clinical Psychiatry.
Psychologies of 1925.
Robinson—Practical Psychology.
Rusby, Henry Hurd—Jungle Memories.
Shutes, M. H.—Lincoln and the Doctors.
Schneider, Edward C.—Physiology of Muscular Activity.
Schwesinger, Gladys C.—Heredity and Environment.
Sutton, R. L. and Sutton, R. L., Jr.—An Introduction to Dermatology.
Taylor, W. S.—A Critique of Sublimation in Males.
Woodworth—Psychology.

Dr. A. H. Deekens,

Richmond, Va., was elected president of the Virginia Chapter, Alumni of the University of Pennsylvania, at a dinner meeting held recently at the John Marshall Hotel, this city.

Dr. Hunter H. McGuire,

After an absence from the city of some months, has returned to his office at St. Luke's Hospital, Richmond, Va.

Virginia Academy of Science.

The twelfth annual meeting of the Academy was held in Harrisonburg, Va., May 4th and 5th, under the presidency of Dr. William A. Kepner, of the University of Virginia. There was an attendance of nearly four hundred. An important action of the Council, was the adoption of a resolution favoring a new and more effective pure food and drugs act, in accordance with a bill then pending before Congress. All sections were well attended and the papers and demonstrations were interesting.

Dr. William T. Sanger, president of the Medical College of Virginia, Richmond, was installed as president for the coming year and Dr. E. C. L. Miller, also of the Medical College of Virginia was re-elected secretary-treasurer, a position he has held since the organization of the Academy in 1923. The next session will be held at the University of Richmond, May 3 and 4, 1935.

Dr. E. G. Brumback,

Luray, Va., for about twenty-five years a member of the board of directors of the First National Bank in Luray, has just been elected vice-president of the bank.

Dr. Wyndham B. Blanton,

Richmond, Va., was the principal speaker before the Colonel William Allen Chapter, D. A. R., in Smithfield, Va., on May the 5th, his subject being "The Colonial Doctor."

Samuel D. Gross Prize.

The Philadelphia Academy of Surgery announces that essays will be received in competition for the Samuel D. Gross Prize of $1,500.00 until January 1, 1935. This prize is awarded every five years to the writer of the best original essay, not exceeding one hundred and fifty printed pages, illustrative of some subject in Surgical Pathology or Surgical Practice, founded upon original investigations, the candidates to be American citizens.

Further information may be received from the "Trustees of the Samuel D. Gross Prize of the Philadelphia Academy of Surgery, care of the College of Physicians, 19 S. 22nd St., Philadelphia.

Dr. Thomas G. Hardy

Has resumed his surgical practice in Farmville, Va., after a post-graduate vacation at the University of Virginia, the Medical College of Virginia, and Johns Hopkins University School of Medicine.

Graduate Fortnight of New York Academy of Medicine.

The Seventh Annual Graduate Fortnight of The New York Academy of Medicine will be devoted

to a consideration of Gastrointestinal Diseases. The Fortnight will be held October 22nd to November 2nd.

Sixteen important hospitals of the city will present coordinated afternoon clinics and clinical demonstrations. At the evening meetings prominent clinicians from various parts of the country who are recognized authorities in their special lines of work will discuss the various aspects of the general subject.

A comprehensive exhibit of anatomical, bacteriological and pathological specimens and research material will be shown. Many of the exhibits will be demonstrated.

The profession generally is invited to attend.

A complete program and registration blank may be secured by addressing Dr. Frederick P. Reynolds, The New York Academy of Medicine, 2 East 103d Street, New York City.

Dr. David B. Stuart,

Recently of Pulaski, Va., has moved to Roanoke, Va., where he has taken over the offices in MacBain Building, occupied by the late Dr. J. M. Ropp, who died recently as a result of an automobile accident.

Dr. George W. Skaggs,

Recently of Page, W. Va., is locating the first of June at Dublin, Va., where he has bought the home and will take over the practice of Dr. D. B. Stuart, who has moved to Roanoke. Dr. Skaggs is an alumnus of the Medical Colllege of Virginia, class of 1908.

New Superintendent at Jefferson Hospital.

Mr. C. B. Short has been appointed superintendent of Jefferson Hospital, Roanoke, Va., to succeed Dr. K. T. Redfield who has moved to Norfolk, Va.

The University of Virginia Hospital School of Nursing

Held the commencement exercises for its graduating class in Madison Hall, at the University, on the afternoon of May the 10th. There were a large number of graduates presented by Dr. J. C. Flippin, Dean of the Medical School. Diplomas were awarded by President John L. Newcomb of the University and the Hospital alumnae pins were presented by Dr John H. Neff. The address on this occasion was made by Dr. John L. Manahan, Dean of the Department of Education of the University, his subject being "The Nurse as a Teacher." Following the exercises, there was a tea at McKim Hall.

Married.

Dr. Harry Lee Denoon, Jr., Nassawadox, Va., and Miss Clara West Holland, daughter of Dr. and Mrs. Griffin Holland, of Eastville, Va., May 15th.

Dr. Otway Kyle Burnette and Mrs. Elizabeth George Haenny, both of Culpeper, Va., May 8th.

Dr. Dudley Curtis Ashton, recently of Richmond, Va., but now of Beckley, W. Va., and Miss Myrtle Irene Cooper, of Asheville, N. C., and Richmond, April 3rd.

Dr. R. O. Glenn,

Of the class of '31, Medical College of Virginia, is now located for practice at Mountain City, Tenn.

Winchester Memorial Hospital.

Dr. Hunter H. McGuire, Winchester, Va., has again been elected president of the Winchester Memorial Hospital, and Dr. James A. Miller, of that city, has been elected secretary to fill the vacancy caused by the resignation of Dr. J. E. Harris.

Conference of County Health Officers.

Special conferences for county health officers were conducted under the auspices of the Virigina State Department of Health on March 26th and 27th. Leading health and medical authorities addressed the meetings which convened at the offices of the Department, State Office Building, Richmond, Va.

The following topics were discussed: Public Health Administration—State and Local, by Dr. A. W. Freeman, Johns Hopkins University; Tuberculosis Problems in County Tuberculosis Control, by Dr. H. S. Mustard, Eastern Health District, Baltimore, Md.; The Possibilities of Research Studies in Connection with County Health Work, by Dr. J. A. Ferrell, of the Rockefeller Foundation; Problems in Relationship between Health, Welfare and Volunteer Agencies, by Dr. G. W. Spicer, Chairman of the Virginia Commission on County Government, and professor at the University of Virginia.

Among the leading trends of thought dominating the discussions were the pressing need for more trained public health workers, the importance of informing the public of what is being accomplished in the field of public health, and the definite relation between the organization of county health work and county government.

Dr. J. Allison Hodges.

Richmond, Va., an ex-president of the Medical Society of Virginia and one of the promoters of the plan for pre- and postnatal instruction of doctors of this state, was invited to be one of the honor guests at the banquet at the Waldorf-Astoria in New York City, May the 10th, on the occasion of the annual meeting of the Maternity Center Association of New York City.

Dr. William F. Hatcher,

Who formerly practiced in Bath County, Va., but later moved to West Virginia, is now located at McDowell, W. Va. He is a member of the class of '29, Medical College of Virginia.

Dr. J. Stuart Staley,

Of the class of '33, Tulane University, School of Medicine, New Orleans, has located at Marion, Va., for the practice of his profession.

Dr. K. T. Redfield,

For several years superintendent of Jefferson Hospital, Roanoke, Va., was recently appointed superintendent of Protestant Hospital, Norfolk, Va., and entered upon his duties there the first of May. He fills the vacancy caused by the death of Dr. James H. Culpepper, a little more than a year ago.

Deaths of Physicians in 1933.

There were 3,354 obituaries published in the *Journal of the American Medical Association* during 1933. Of this number, 3,209 were from the United States. The average age at death of those classified as of the United States was 64.4. Heart disease was again the leading cause, with 1,131 fatalities as compared with 1,101 for 1932. Cerebral hemorrhage was the second most frequent cause reported. Pneumonia, cancer, and arteriosclerosis follow in the order named. One hundred and forty-eight physicians died as the result of accidents, automobile accidents accounting for seventy-five. Suicide was the cause of seventy deaths in 1933, seventeen less than in 1932. There were fourteen homicides.

A full report of these deaths may be obtained from the April 21st issue of the *J. A. M. A.*

Dr. Douglas VanderHoof,

Of Richmond, Va., was recently elected president of the Dartmouth College Alumni Association of this city.

Dr. William Reese,

Petersburg, has been elected exalted ruler of the Petersburg Elks Lodge.

Rotary Officers.

Dr. Charles Outland was recently elected a member of the Board of Directors of the Richmond Rotary Club.

Dr. B. B. Dutton was elected vice-president at a recent meeting of the Winchester Rotary Club.

American Medical Association Meeting.

This is just a reminder of the annual meeting, to be held in Cleveland, June 11th-15th, under the presidency of Dr. Dean Lewis, of Baltimore. The House of Delegates will convene on Monday, June 11th, and the scientific assembly of the Association will open with the General Meeting on Tuesday, June 12th. The various sections will begin their meetings on the 13th.

Dr. John Robertson,

Onancock, Va., addressed the May meeting of the Accomack Community League, May 10th, his subject being "Working for Dear Life."

Leslie Dana Gold Medal.

This medal, awarded annually for outstanding achievements in the prevention of blindness and the conservation of vision, was presented Dr. F. de Lapersonne, noted French ophthalmologist and president of the International Association for Prevention of Blindness, at the annual meeting of the Association held in Paris, May 14th. Dr. Lapersonne is the second European to be awarded this recognition.

Graduate Nurses' Association of Virginia.

At the annual convention of this Association, held at Virginia Beach, Va., in May, the following officers were elected: Miss Frances Helen Ziegler, Richmond, president; Miss Nina D. Gage, Hampton, and Miss Mary I. Martin, Richmond, vice-presidents, and Mrs. Jessie Wetzel Faris, Richmond, secretary-treasurer. Miss Blanche F. Webb, Norfolk, was elected a member of the Board of Directors.

Dr. Clarence W. Trexler,

Honolulu, Hawaii, has been appointed as medical examiner for Aeronautics Branch of the Department of Commerce in Honolulu. He will examine all civilian air pilots. Dr. Trexler is a graduate of the University of Virginia, class of '26.

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The American Proctologic Society

Will hold its annual meeting in Cleveland, June 11th-12th, under the presidency of Dr. Curtis C. Meckling, Pittsburgh, Pa. The scientific program is made up of many interesting and instructive papers.

Information with regard to this meeting may be obtained from the secretary, Dr. Frank G. Runyeon, 1361 Perkiomen Ave., Reading, Pa.

Dr. John M. Love,

Formerly stationed at Walla Walla, Wash., has been transferred to the U. S. Veteran's Administration Faculty, Fort Bayard, N. M. He is a native Virginian and has been a member of the Medical Society of Virginia for twenty-five years.

Hebrew University in Jerusalem.

A trust fund of approximately $200,000 has been created by anonymous donors to be used over a period of ten years for the establishment and maintenance of a department at the Hebrew University for research into the causes and cure of cancer, according to an announcement made by Dr. Judah L. Magnes, Chancellor of the Hebrew University in Jerusalem.

The University proposes to begin its work in cancer research in those fields in which the material at hand is sufficient to place the laboratories on a level with similar scientific institutions in Europe and America. The plan worked out provides for research in radio-biology, physiological chemistry and the study of cells and tissues.

Unusual Opening:

In Tidewater Virginia, residence and fully equipped office for practice of medicine and surgery. An unusually good opportunity for a physician and surgeon of ability. If interested, address No. 439, care this journal, 1200 East Clay Street, Richmond, Va. (*Adv.*)

Obituary Record

Dr. George Paul LaRoque,

Prominent surgeon of Richmond, Va., died suddenly May 16th, while leaving a train in Cincinnati where he had gone to attend a meeting. He was born in Kinston, N. C., and was 57 years of age. Dr. LaRoque received his medical degree from the University of Pennsylvania in 1902, and had made his home in Richmond for nearly thirty years. At the time of his death Dr. LaRoque was professor of clinical surgery at the Medical College of Virginia, and was exceedingly popular with the student body at the College. He had been a member of the Medical Society of Virginia for twenty-nine years. His wife and two brothers survive him.

Dr. William Francis Cooper,

Newport News, Va., who retired from active practice only a few months ago, died in that city on May 20th. Dr. Cooper was a native of Warrenton, Va., and seventy-eight years of age. He studied medicine at the University of Virginia and Bellevue Hospital Medical College of New York, graduating from the last named in 1879. He had been a member of the Medical Society of Virginia since that same year and served a term as vice-president of the Society.

Dr. John Marsham Ropp,

Roanoke, Va., died April 29th, as a result of injuries received in an automobile accident. He was sixty-seven years of age. Dr. Ropp received medical degrees from the Vanderbilt University, Tenn., in 1891, and from the University of Nashville in 1892. He had been a member of the Medical Society of Virginia for thirty years.

Dr. Thomas Scott Hening,

Well-known physician of Powhatan County, Va., died April 29th at his home near Maidens. He was 61 years of age and a graduate of the Medical College of Virginia in 1894. Dr. Hening was a member of the State Senate from 1916 to 1924, and was formerly a member of the Medical Society of Virginia. His wife and three children survive him.

Dr. William Henry Welch,

One of the most beloved and renowned medical men of this country, died at the Johns Hopkins Hospital, Baltimore, April 30th. He was born in Norfolk, Conn., in 1850, and received his medical degree from the College of Physicians and Surgeons of New York, in 1875. Dr. Welch was one of the five members of the original Johns Hopkins Medical School faculty and held the first professorship of pathology at that school. He was a past president of the American Medical Association and had served on a number of national and international boards. As evidence of the esteem in which he was held, Dr. Welch's eightieth birthday was honored with an international celebration.